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SOME OPINIONS AND COMMENTS ON CURRENT TELEPHONE TOPICS

We are often told that life in these United States is geared pretty high. The pace is undoubtedly fast in America, and we do not realize just how swiftly the poles rush past our window until we come to a pause in the journey and stop long enough to look back over the road we have traveled. That backward glance reminds us how far we have come along the chosen path.

The review of telephone developments in 1927, printed in last week's issue, emphasized this thought as applied to the year's progress in the telephone industry. Business moves rapidly in this country, and the telephone field was no laggard in achievements.

It required nearly six pages to record, in the briefest fashion, the high spots in telephone history for the year. For the most part they were merely referred to—brief suggestions, leaving the imagination to supply the details of the mileposts reached and passed in the great telephone industry which is the backbone of the country's communication system.

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It is interesting to remember that all these events and developments were reported in TELEPHONY'S current issues throughout the year. They were brought to the attention of the telephone field as they occurred, or became known, and formed a part of the budget of news and information which this journal supplies the industry it serves every week. Yet it required the collected data of the "Review of the Year," probably, to make telephone men appreciate fully the real significance of the year's progress.

Busy as we are with the daily duties, we often lose our perspective. Looking back, we can see that the telephone industry made important advancement in the year just closed. Here's hoping that the business continues the good record in 1928.

* * * *

Telephone companies and all public utilities await with much anxiety the action of the United States Supreme Court with regard to the O'Fallon Railroad decision by the federal court at St. Louis. This decision ruled that in valuing utility property the emphasis need not be on reproduction cost at any particular time rather than on the original cost of the property. The railroad has appealed the case.

If the highest court should affirm the decision, it would tend to establish the principle that utility rates are to be based on original costs instead of present values. This, of course, would be decidedly unpleasant news to some of the newly-formed telephone groups that have bought properties on present-day values—and on most liberal appraisals—planning to have their rates based on the same estimates. The case is considered one of the most important affecting utility valuations and rates.

* * * *

All public service companies are hoping the U. S. Supreme Court will not affirm the finding of the St. Louis tribunal. Otherwise the rate situation in all utility fields will be threatened with many upsets.

The effect of the St. Louis decision is to uphold the Interstate Commerce Commission in its action fixing a valuation of the O'Fallon road which had contended the commission's figures were too low. The commission reached its conclusion by ascertaining the value of the property in 1914, on the basis of actual investment and commodity prices prevailing then, and adding thereto prudent capital outlays since that time.

The railroad asked the court to hold that reproduction cost be made the determining factor. Present price levels being higher than in 1914, acceptance of the railroad's argument, of course, would have increased the valuation considerably.

* * * *

This case, which has been termed "the biggest lawsuit in history," because of the immense issues at stake, is expected to be a test case on the question of the theory of valuation of railroad and all public utility properties.

The general opinion was held that the St. Louis court in its decision would choose between the "prudent investment" and the "reproduction cost" theories. However, while the court avoided a decisive ruling on this important question, it upheld the commission which had followed the policy leaning more to original investment than to reproduction value. The railway counsel hold that the question of the theory of valuation remains to be decided absolutely.

This is what the United States Supreme Court is expected to do, and all utilities believe that fairness demands that the "reproduction cost" theory be established in order to insure them service rates adequate to their needs.

* * * *

Meanwhile there is much discussion in the press regarding the question, and, generally speaking, it is favorable to the utilities' position. If rates were to be granted to a new company furnishing service to a community, it is apparent that those rates would be based on the cost of the property.

Then the question arises: "Why should not the rates for an old company be based on the reproduction costs of the old property, as the existing plant must continually be reproduced to maintain equipment so it will render satisfactory service?"

One New York paper, commenting on the matter, says: "It would seem as though there were no way to get away from 'reproduction cost' as the basis of rate-making, for any property continually used is reproduced many times over a period of years, and this cost must be covered in rates charged for service, else the company goes bankrupt."

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The article on telephone taxation recently printed in these columns attracted much attention from telephone men whose comments, naturally, run along the line that the American people should stop the rising tide of bigger taxes.

George Spalding, tax commissioner for the Mountain States Telephone & Telegraph Co., has sent TELEPHONY a copy of an address he made before the Western States Taxpayers Conference, held in Santa Fe, N. M., in September on the subject, "The Trend of Taxation." It is a very thorough survey of the whole tax situation and particularly in Western states, containing charts, figures and comparative data which throw definite light on the way taxes have soared, especially within the last ten years.

With commendable fairness Mr. Spalding admits that improvements in American conditions have necessarily cost money, and compelled higher taxes, but he also points out that there could be greater economy in state, county and municipal government, and that undoubtedly our good roads, schools and other public works could still be supported at a less expense to the taxpayers.

An interesting feature of Mr. Spalding's research is his chart showing the percentage of national income paid out in taxes for various years between 1890 and 1926. In 1890, our national income was a trifle over 12 billion dollars, and 7.2 per cent was paid out in taxes. In 1926 the National Industrial Conference Board statistics give the national income as a little over 78½ billions, and the taxes amounted to 10.8 per cent.

During the period from 1890 to 1926, the highest per cent for taxes was in 1921, when the national income was 55½ billions and taxes paid amounted to 15.9 per cent. The lowest per cent was in 1913 when the national income was less than 34½ billions and the percentage paid for taxes was 6.4.

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Speaking as a telephone man, Mr. Spalding says: "In fairness to my company I wish to make the unqualified assertion that I do not, neither does the executive management of my company, seek or desire to escape one cent of our fair proportion of the cost of government. But as we are operating a public utility, furnishing an essential service to all the public, it is our obligation to patrons, shareholders and employes alike, to see to it that no item of unreasonable or unjustifiable expense enters into the cost of the service. It is an obligation of stewardship imposed upon the management.

"The item of taxes enters into the expense of operation, so our responsibility is not to avoid the payment of taxes, but to strive for economy in government and the equal and just distribution of the tax burden." That is sound sense.

COMING CONVENTIONS.

South Dakota Telephone Association, Huron, Marvin Hughitt Hotel, January 10, 11 and 12.

Arkansas Telephone Association, Little Rock, Hotel Marion, January 16 and 17.

Nebraska Telephone Association, Kearney, Ft. Kearney Hotel, January 17, 18 and 19.

Minnesota Telephone Association, Minneapolis, Radisson Hotel, January 24, 25 and 26.

North Dakota Telephone Association, March 6, 7 and 8.

Oklahoma Utilities Association, Tulsa, Mayo Hotel, March 13, 14 and 15.

Texas Independent Telephone Association, Fort Worth, Texas Hotel, March 20, 21, 22 and 23.

Ohio Independent Telephone Association, Columbus, Deshler-Wallick Hotel, April 11, 12 and 13.

Up-State Telephone Association of New York, Powers Hotel, Rochester, May 23, 24 and 25.

Some Simplified Operating Methods

How Service May Be Improved by Changing Operating Practices or Phrases from Time to Time—Method Used in Teaching Students Outlined—First Award Paper in Traffic Division of "Telephony's" Prize Article Contest

By Miss Bess Peterson,
Chief Operator, Marshall Telephone Co., Marshalltown, Iowa

Improvements are made in the service on both local and long distance by changing operating practices or phrases from time to time; changes that will not only be a benefit to the traffic department but will also help the service from the subscribers' viewpoint.

Those interested in traffic work are only too glad to have the opportunity to try new methods and see the effect they have towards improving the service condition. You may have in your exchange instructions covering the handling of local or toll operating practices which you should follow out. Yet, did it ever occur to you that perhaps you might add to those instructions, or work them over to the extent of making them suit your particular office? We need to do this occasionally in order to make service improvements, and who is more capable of doing this than the person in charge of traffic?

There are a number of different types of switchboards, and the operating practices

The exchange at Marshalltown, Iowa, of which Miss Peterson, author of this article, is chief operator, is the toll center for more than 30 towns. In the course of handling the toll traffic from these tributary offices, Miss Peterson has come in contact with many and varied operating conditions and has suggested methods making for faster handling of calls and more satisfactory relations and service to patrons.

The toll and local traffic of the Marshalltown exchange is taken care of by a personnel of 45 including the chief operator. The various suggestions for simplified methods of operating presented in this article are based upon practices that have stood the tests of practical service.

Starting in as an operator in 1902, Miss Peterson was promoted to long distance chief operator and then to chief operator which position she has held since 1910.

She is ever on the alert to improve methods and eliminate unnecessary motions in traffic handling that will bring about better service.

One of the practices recently introduced at the Marshalltown exchange came about through her visit to one of the Chicago exchanges last fall at the time of the National convention.

At the keyboard positions where numbers are set up by the operators in connection with automatic calls, she observed that the operators sat with their hands palms down resting on the keyboard desk, waiting for calls to come in. This waiting position gave the nucleus of the idea for the change in the waiting position for calls of the operators at the Marshalltown exchange, as is described in the article.

Miss Peterson is an inveterate seeker of ideas and knowledge that will aid her in the planning and executive phases of her work. Her wide and varied operating experience enables her to write authoritatively on exchange management, and she has the reputation of "knowing whereof she speaks."

which are given out do not meet the requirements of all boards. Therefore it is necessary to make over these instructions to meet conditions.

To illustrate the meaning of this, an example will be presented. When challenging on a connection, do you use the phrase, "Are you waiting?"

This phrase is not understood by subscribers. Nine times out of ten, the subscriber's answer is "Yes"; in reality, he is waiting, but what is he waiting for? He is waiting for the number he called to answer. Had the operator asked, "Did they answer?" the subscriber would have said "No."

While talking over long distance to one of our tributary operators, she opened a key and challenged one of her local connections by saying, "Are you waiting?" and the subscriber said "Yes." I asked her, "For whom was the party waiting?" She laughed and answered, "I do not know." I suggested that she again go in on the connection and say, "Did they answer?" This she did, and the subscriber replied, "No, not yet."

Subscribers are kept waiting because of the operator not using a phrase best suited for challenging on certain types of boards. You can easily see that if this phrase is in use in your office, it should be checked up. Use "Did they answer?" in place of "Are you waiting?" when challenging.

On your type of a switchboard, is it necessary to go in on connections and give the "Don't answer" report? This is another important phrase that could be improved upon.

Some offices say "582 don't answer," others say "Don't answer," or "They don't answer" and "They do not answer." The last phrase is the most suitable, providing the operator says it in the tone of voice that conveys to a subscriber that she has actually tried to get the number asked for.

When giving a "busy" report too many operators want to cut this phrase short by saying "Line's busy." This causes the subscriber to wonder whether the called number is actually "busy," or "Did the operator say it to get rid of me?"

Other operators say "582's busy." If the operator had used the phrase "The line is busy" and pronounced each word distinctly, the subscriber would know that the called number was busy, for the operator had taken time to say so.

We have a number of different answering phrases. To my knowledge the first answering phrase ever used was "Hello." The subscriber answered the greeting by saying, "Hello, Mary, will you ring Smith's store for me?" The operator made no answer but did as she was told. From this method of answering the telephone operators received the name of "hello girls."

A great number of smaller exchanges answer their subscribers by the name of the town. This is in rural communities. For instance, the operator upon answering gives the name of her town, and the subscriber replies, "I want the depot." In this case also the operator merely closes the key and rings the party asked for. If she does not understand what the subscriber wanted, she asks, "Who do you want?"

In both answering phrases used, the operator was told whom the subscriber wanted, but no mention was made of any number, yet all telephone companies ring their subscribers by using the number method.

The operators in the smaller exchanges are not so fortunate as those in the larger exchanges because there you find subscribers must call by number. There you will also find girls whose sole duty it is to handle calls from subscribers who do not furnish the number.

I am daily in contact with offices which use phrases other than one in which the subscriber is requested to give a number when calling.

If you want to operate by receiving numbers from your subscribers, use the phrase, "Number, please?" This tells the subscriber you want a number. Another phrase is "Number?" but I do not care for this phrase, for it is of a commanding nature, and the subscriber shouts back the number.

The word "Please" added to "Number" gives a personal touch. It can be said in a tone of voice such that the subscriber is glad to do what you ask—give the number wanted. When our office added "Please" to the answering phrase "Number," the attitude of the subscriber towards the operator was changed for the better and vice versa.

In talking with an operator who handles a switchboard of some one hundred drops, I asked why she answered with the name of the town. She replied: "Because we have never changed, I guess. It is what they told me to say and I am still saying it."

I questioned an operator of a smaller exchange as to why she did not use the phrase, "Number, please?" She answered, "I can't say that because our subscribers are mostly stockholders of this company, and I would not think of asking them for the numbers."

When an operator told me recently that she was a human telephone directory because her subscribers never called by number, I asked what answering phrase was used, and she said the name of her town. She had made herself into a human directory because she never had asked the subscribers for the number. Therefore, this was not the entire fault of the subscriber.

Nearly all the telephone companies furnish their subscribers with telephone directories, but if the subscribers make no use of them, why go to the expense of having them printed?

Where there are directories, subscribers should be taught to use them. First, however, the answering phrase used will have to be changed to "Number, please?" When starting out with this phrase, some difficulty may be encountered with subscribers, but it will be found that in a week's time, nearly all will be answering the operator's question by responding with the number.

If after saying "Number, please?" the subscriber gives his call by name, start by repeating the name and adding the number. You may also add "I will ring them." This

gives the subscriber a chance to memorize the number as well as to realize that you want him to call by number.

If the subscribers continue to call by name after a week's trial, question them by asking, "What is the number, please?" This means that you want them always to be ready with a number and not a name. If a subscriber then furnishes it, say "Thank you." If no results are obtained, a subscriber should be questioned as to whether or not he has a directory.

Any office attempting to request their subscribers to furnish them with telephone numbers should start it as soon as its next telephone directory is issued. Do not attempt it until all the operators are familiar with the phrases and also ready for subscribers' comments. I am sure you will find that the subscriber will cooperate with you. If you encounter difficulty in establishing this practice, explain that during certain hours the traffic is increasing and that you would appreciate it if subscribers would please take time to look up the number before they call.

One operator should not be permitted to tear down what others are building up, by allowing subscribers to call by name when the other operators are insisting on numbers.

Operators in the smaller exchanges like to accommodate their subscribers by doing all they can do for them, but it is a waste of money to print directories unless use is made of them.

In introducing new or improved methods in the traffic department, it does not mean that any additional expense is necessary before such work can be accomplished. A few suggestions are: Attending traffic conferences, keeping posted by reading articles pertaining to traffic work in telephone magazines, and by visiting larger exchanges.

The chief operator, or operator who is sent to a conference, should attend with the purpose that she take up and discuss her traffic problems and receive instructions how to overcome them. Rsading matter gives her some wide-awake material as to advancement in all lines of work. A few hours' visit to a larger exchange will assist her in putting into use the different operating practices and phrases. There is a personal benefit received in this visit.

There are different methods used in instructing student operators. Some of the larger exchanges have special schoolrooms assigned for such work, but most exchanges instruct at the main switchboard. This work may be done by the chief operator or supervisor and, in the smaller exchanges, by one operator teaching another.

The method used in teaching students should be that in which the least time possible is consumed, yet one should avoid hurrying through the training course. The progress of the student depends on the thoroughness of the instructions.

The instructor should see that the first few days of training are made as interesting as possible. Encourage the student in every way and prevent her from becoming discouraged.

After the student has been given a general outline as to the training she is to receive, she is taken to the switchboard and an explanation is made as to the different parts of the equipment and how connections are established. The student should then be allowed to plug in with the instructor who endeavors to show her, step by step, how to answer calls by actual operating. After listening-in for one hour, ask the student if she would like to handle one call. Indeed she is glad to do so, for the one thought in her mind is that "I could do it if I were permitted.

"When Undertaking to Work Out Simpler Methods," Says Miss Peterson, "Do So with Enthusiasm and the Cooperation of the Entire Force. Then It Will Be a Pleasure."

Again, she should listen with the instructor who continues to explain how each connection is established. The student operator should then be asked to explain how to establish a connection. While still seated at the switchboard, give her practice in multiple reading. The student should then be allowed to remove her headset and observe the work of different operators, while the instructor coaches her in handling different kinds of calls. This completes her morning's work.

The teaching in the afternoon should begin with review and again listening-in with the instructor. The simpler methods should be taught first, following with more advanced methods. As soon as the student can outline the handling of a straight local call, have her take the switchboard position, the operator being allowed to do all work as far as the handling of the cords and the keys with the supervisor doing all the talking.

To answer a call, the operator inserts the answering plug in the answering jack, the instructor saying "Number, please?" and at the same time the student picks up the ringing cord. The subscriber gives his number, the instructor answering with "Thank you." She then points out the number wanted to the student by the use of a pointer. The student tests this number, plugs into the jack and rings.

During the process of completing the connection, the instructor carefully checks the work of the student to see that she is following a correct method. The operator is doing actual operating as far as handling the equipment is concerned and she also is listening to the use of all phrases, when to use them and the tone of voice used. No phrases are given to her for memorizing until she has a thorough knowledge of the establishing of connections and can use some speed.

This takes at least four or five days' time. The operator is then taken from the switchboard and given a verbal test as to the general routine of her work. This is followed by the phrases, 30 in all, which are typewritten. This is the only printed instruction given to the student and no writing whatever is required.

The operator has good understanding of these phrases, for she has already been taught them at the switchboard while listening to the supervisor. She also has already been trained in giving the phrases.

The student should be carefully drilled in voice work as the results obtained from this training are generally lasting. The student is allowed to answer her calls at the beginning of the sixth or seventh day of her training, the instructor remaining with her for a period of 12 days for the purpose of further instructions. On her 12th day she should be given a complete verbal test in reviewing her work.

It will be noticed that by this method the student is ready for actual operating with a five-hour training period. This can be done by receiving a thorough training from the start. She is not allowed to listen in with any other operator than the instructor who is doing actual operating. This method has been found to be the most satisfactory way of instructing that we have ever used.

The more simplified our method of teaching, the faster the operator learns. She is as efficient an employe at the completion of the shorter training course as one whose training period covers three to five weeks.

At least twice a year, all traffic employes should be given written tests by the chief operator. The questions should be those of importance pertaining to the different phases of work. Corrections should be made on the paper by not merely a mark but by writing out the correct answer. It is surprising the help an operator obtains from these examinations.

In our handling of service at the switchboards, simplicity should be our aim in endeavoring to cut down as many extra steps

as possible in the operators' work and yet give a better grade of service. We know this is true from the standpoint of those who design switchboards. Therefore, we who operate them should also be working toward eliminating extra movements.

No doubt you have visited exchanges where the local operator holds in each hand an answering cord, ready for action when a line signal appears. When she inserts her plug to answer, she replaces the answering cord not used in the socket and completes her call. This same action takes place if a disconnect signal appears. She must replace her cord before taking a disconnect down. When this is done she again picks up the answering cord.

The holding of two cords, or perhaps one, is for the purpose of having an operator alert and ready for action immediately when a line signal appears. Since it is possible for more than one operator to answer such signals, are there not other signals of greater importance?

Did you ever stop to think that a connection established where the called party has not answered is more important than a signal not answered? Therefore, more time should be taken by the operator in supervising her connections already established, for it is then that a subscriber is waiting for service.

Noticeable improvement has been found in the work of our local operators by eliminating some of our old practices and substituting better ones; for instance, completely doing away with the holding of an answering cord ready for line signals. No cord is held, the hands being placed, palms down, on the keyshelf off the keys while waiting. The operator's hands are then ready for prompt action, either to answer a flashing supervisory signal, disconnect or to give attention to other supervisory signals.

When a line signal appears, the operator picks up the cord nearest the signal, inserts the plug; at the same time the other hand opens the listening key, the ringing cord is instantly picked up by the hand opening the key.

No time is lost in handling calls in this manner compared with the way which makes it necessary for an operator to replace the cord held in the hand.

In using this method it may be thought that the operator will become lax in her work to the extent of delaying service. This is not the case if you allow the operator to become her own supervisor of her calls answered, and teamwork develops between operators. Our operators are allowed to handle their own positions with the help of operators on adjacent positions in pointing out or answering their recall signals and assist, when necessary, in disconnecting. Cooperation between operators should be worked up here as this is a great help in operators giving faster service.

The work of a supervisor also has changed since this method went into effect in our exchange. Her position is behind the operators—at least five feet back—to go to any position where help is needed for the purpose of directing the operator in handling her work. She should be plugged in with the operators for the purpose of coaching them in their work.

While doing this she stands back of the operator the full length of her headset cord. At the same time she turns her head so she may watch all positions and see that the eyes of the operators do not wander away from their supervisory or line signals. This is very important, for it keeps the operators alert and ready for action.

The supervisors do not walk back and forth behind operators, and are not allowed to sit down during their time of supervising. Supervisors stand up two hours at a time. When not on the floor, they are observing the work of operators from the observation board. Each time an error is found on an operator, she is immediately told of it, and this correction written up. These reports are similar to report cards and are used to check the work of each operator.

The duties of the supervisor on the floor are lessened by this practice, but nevertheless are of greater importance. In making corrections on the operator regarding her work, the supervisor does not merely tell an operator but also shows her how it is done.

The supervisor should correct those under her supervision in such a way that an operator appreciates being told of her mistakes; also she should become a real friend to operators. Talk kindly to them, and they will wish to do their work well.

When undertaking to work out simpler methods, do so with enthusiasm and with the cooperation of the entire force. Then it will be a pleasure.

"The things that haven't been done before,
Those are the things to try."

Young Operator Heroine of Destructive Fire in Ohio Town.

A 17-year-old telephone operator was the heroine of a $125,000 fire which destroyed two entire business blocks, including the telephone exchange, in Wakeman, Ohio, on December 13. She is Miss Maxine Benson, night operator of the Northwestern Ohio Telephone Co. at Wakeman.

She was on duty when the fire was discovered and ran into the street and sounded a siren to summon the local fire department. Then she telephoned the Norwalk fire department, 12 miles distant, also the Oberlin department. Her attention was next directed to calling out the townspeople to warn them of the fire. She stuck to the board until firemen carried her out while smoke and flames poured into the switchboard room.

Before the fire was entirely out, the Northern Ohio company's Wakeman toll line had been connected and a toll station established in a residence across the street from the fire. A new switchboard was installed in the home of Manager R. C. Dodd and service re-established in 24 hours after the fire, the installation crew working all night. The new board which serves the 245 subscribers of the Wakeman exchange of the Northern Ohio Telephone Co. was placed in the living room of Manager Dodd's new home which was so ager Dodd's new home which was quickly converted into an exchange.

Rotation Billing for Chicago Subscribers of Illinois Bell.

Rotation billing, the plan by which monthly telephone bills are issued in groups throughout the month instead of all on one day, will be put into effect in Chicago during January and February by the Illinois Bell Telephone Co., according to announcement made this week. It has been in effect in the suburban territory for some time.

In starting the new plan it will be necessary for the company to send two bills during January to some subscribers as the transition to the new plan must be accomplished gradually. After the transition has been completed, all bills will cover one month and will be divided into six groups, dated the first, sixth, 11th, 16th, 21st, and 26th of the month.

The new plan applies only to subscribers whose calls are metered at the central offices and not to coin box service.

Fort Dodge Company Now a Delaware Corporation.

The Fort Dodge Telephone Co., Fort Dodge, Iowa, on December 31, became a Delaware corporation instead of an Iowa corporation. Aside from transferring its legal residence from Iowa to Delaware, no change will take place in the company, the stockholders, policies, personnel, and name remaining the same.

The purpose of the transfer is to secure greater flexibility in corporation affairs.

Directories in New York City Have Many Changed Numbers.

The new issue of the telephone directory of the New York Telephone Co. for New York City, has an enlarged information section. About 30 per cent of the 1,200,000 listings in the new directory had to be revised. More than 3,000,000 books, weighing about 7,500 tons, have just been delivered.

"Because of the numerous new and changed numbers," a company announcement says, "subscribers are advised that it is important that any private list of numbers be revised and brought up to date, thus eliminating the possibility of calling for numbers now obsolete."

One exchange designation in Manhattan "Lennox," has been discontinued and a new one in Brooklyn, "Minnsota," added.

Studying the Telephone Business

Here Is One of Series of Two Articles Which Contain Valuable Information and Suggestions for Anyone Desirous of Self-Improvement Through Home Study—The Ideas Have Stood Test of Trial and May Be Used by Anyone

By M. E. Layton

Ignorance, not knowledge, rejects instruction; it is weakness, not strength, that refuses cooperation.

In the olden days, any training a telephone man got was received at the end of a digging bar, at the switchboard, or perhaps while collecting or paying a few bills for the company. He was an all-around man. All of the many jobs in the installation, maintenance, and operation of an entire telephone plant were his to accomplish; they were all in the day's work.

He made little or no distinction between plant, traffic, commercial, engineering, or accounting functions. To him, each of these was considered as part of the job. He started out early in the morning and, in the course of a long day, probably did work which now would come under each of the various specialized classifications just given.

Versatility of "Old Timers."

In collecting bills that were due the company, and paying others, making a record and report of his transactions, he performed both commercial and accounting functions. When he installed a telephone, repaired a line and stopped to see how the construction crew was setting a new lead of poles, he functioned as a plant man. When he operated the switchboard at night, or sometimes during the day if the operator was ill, he was performing the duty of a traffic employe.

The telephone man of today is a specialist. Telephone operations are on a very much larger scale. Highly functionalized departments and branches of departments share the larger company's responsibilities. In such large, highly-specialized organizations, it is not ordinarily an easy matter for an employe of one department to obtain a complete understanding of the work another department is doing, not to mention his acquiring a comprehensive view of the organization as a whole.

It is generally realized, however, that if telephone employes are to perform their duties with maximum proficiency, if they are to efficiently cooperate with others and make intelligent contact with the public, it is essential that they understand, to some degree at least, the general principles and policies upon which telephone company practices are based.

With a better knowledge of the work and problems of the other departments, the reasons for some of the things they are doing in connection with their own jobs will become more evident. They will more fully appreciate the necessity for and value of accuracy and close cooperation between individuals and departments. The result of these better relations will be to make the doing of a better job easier for everybody.

To help all employes gain this knowledge about the telephone industry, books are published and articles written. In these an attempt is made to give to the student the advantage of the old-time telephone man's viewpoint by presenting him a description of the business as a whole.

It is not here contended that the educated employe will, because of this act alone, be given advancement. He should, however, be better fitted for advancement and better able to understand and apply to the job what further knowledge he may gain through departmental experience or specialized study. His will be a trained mind—not finished, perhaps, but improved. It is the trained mind that solves problems more readily and makes of any job an activity to be enjoyed rather than a task to be endured.

In any walk of life a person must seek advancement through his own energy—his own labor, his own sacrifice and his own initiative. This should be accompanied by a quick sympathy with his fellows and a readiness to cooperate with them for the common good. He must be well informed to advance, for, other things being equal, the trained mind always wins over the untrained mind.

Advantages of Training and Education.

The greatest value of proper education is that it awakens the powers of the mind. It trains the mind to grasp ideas, analyze theories and pass good judgment. It develops an individual's appreciation of literature, art, and science.

This is probably why many adults attend night school and study subjects outside of their own business; why employes study the principles of the work in other departments and of the respective companies as a whole. It helps to shake them free from the routine of things. It increases their ability to reason, and affords them the greater knowledge needed to solve the problems of the business. It prepares them to meet the harder jobs just ahead. In other words, it teaches them to use their heads, and in all their affairs to apply intelligent and well-directed effort.

For many persons a training course or a self-laid-out system of reading may serve as the beginning of a well-rounded, far-reaching, vocational education. First of all, such a course should imbue the careful student with a properly-balanced sense or self-realization; it should help him to discover himself, and acquaint him with dormant powers that he may develop. It should uncover and develop qualities in him that he never dreamed existed. It should be of direct, tangible value to him in his business and social life.

His mind, having become more active, the student may desire to take up some of the opportunities for specialized training that may be available. To do this there must be study—not of the haphazard sort, but a steady increasing kind that brings each hidden power to full strength without strain or break.

Well Informed vs. Poorly Informed.

There are so many well-informed men entering every walk of life today that the poorly-informed man finds himself seriously handicapped. The ignorant employe is today regarded as a "second-rater." That there are many of these in industry and elsewhere is substantiated by the figures which disclose that of the 1,600,000 men drafted in the World War, 200,000 were "illiterates" who had to be taught how to sign their names.

The ignorant man, and he of only superficial knowledge, cannot delve down to the fundamentals of the job, cannot grasp the "why" of it and the "wherefore" of it, cannot master it. Because he lacks knowledge, the efforts that he does make are not always intelligent or well-directed and therefore not so successful.

Every telephone employe knows that the strength in the legs and arms of linemen has been gained by exercise, and that their bodies have grown strong with use. Similarly, this is true of the brain of the thinker—lineman or whoever he may be. His continual thinking increases his power to think. Every problem solved makes future problems so much easier to solve.

It is sometimes discouraging at the beginning of a course of reading for the student to find himself slow in understanding. His attention wanders away from the reading in hand; it seems to require great effort for him to concentrate his thoughts. He must then remember that the brain, unused to definite and exacting thought, is like the body unused to labor.

For example, the telephone central-office employe, suddenly compelled to do line work, would find himself stiff and sore at the end of his first day's work. His muscles, unused to the strain to which

they had been subjected, would suffer from the unaccustomed task. In time, however, after his muscles had become used to the new occupation, the soreness would wear off, and he would find his powers of bodily endurance constantly increasing. In other words, the body adapts itself to whatever reasonable task that may be required of it. This is true also of the brain.

When the manual worker begins to demand exacting attention of his mind, he finds his mental apparatus stiff, hard to start, and easily tired. He must remember that, in beginning study, he is bringing into use powers of the mind which have been lying idle. If he continues, the brain will soon run smooth, like a piece of well-oiled machinery.

He may find the first few lessons, articles, or books, yea, even this very article on "education and training in, and how to study the telephone business" meant only as a guide, difficult to master—but he should not let this discourage him. It is not because he lacks ability; it is because he has undertaken a new line of work. His mind will adapt itself to its new tasks as he proceeds with his reading and studies. Mastery of this article in itself will be a stepping stone to future worthwhile conquests.

It may seem that one student does not have natural ability to the degree possessed by some of his friends. Certain persons are naturally gifted with the ability to learn easily. Others must study hard in order to acquire knowledge. But these differing degrees of ability to do things are never fixed for life. Will-power, originality, decision, resourcefulness, imagination, initiative, courage—these qualities of mind are not always gifts. Every one of these qualities can be developed by useful effort, just as muscles can be developed by exercise.

It is not meant by this that the student can add to the brains that nature gave him, but he can learn to make use of the brains that he has instead of letting them fall into flabbiness through disuse. The man who is "born clever" may lose his cleverness by neglecting to use his powers, while the naturally slow learner may, by earnest effort, become a thorough scholar.

History is full of examples of boys who were "dull" at school, but who came to be among the greatest men of their time. The man of small natural ability who strives to improve himself is sure to prove superior to the one of great natural gifts who depends on his "smartness" to carry him through life.

This may be expressed by analogy somewhat as follows: As in photography, so in thinking, a proper exposure is necessary for good results. On a bright day when the light is intense, almost instantaneous impression may be made. On the other hand, when it is a dark day, the exposure must be longer. Similarly, with the minds of students. The extremely bright student thinks rapidly and immediately comprehends; the student not so quick to understand is slower to form his concepts.

There is no reason for the less rapid reader to feel discouraged; he need only be patient and think more deeply. Some students read rapidly and immediately understand; unfortunately, however, not a few of these with equal facility forget what has been read. The mind in this case has been "underexposed." It is also possible to dwell on a thing so long that eventually the mind becomes fogged. This mind has been "overexposed."

Ways of Looking at Work.

Man must work. That is as certain as the sun. But he may work grudgingly or he may work gratefully; he may work as a man, or he may work as a machine. There is no work so rude that he may not exalt it; no work so impassive, that he may not breathe a soul into it; no work so dull that he may not enliven it.—Henry Ford.

Before continuing, it may be interesting to consider a word of advice from one of the greatest leaders the telephone business has produced—the late Theodore N. Vail of the Bell system.

"Anyone who hopes to achieve success," said Mr. Vail, "even the average, must know more, or at least as much . . . as any other one; and not only know, but know how to do—and how to utilize his experience and knowledge for the benefit of others. Broad success depends on singleness of purpose, clear perception of what is to be desired and to be accomplished, and capacity to recognize true values of men and things and properly place them.

"Thorough preparation in elementary knowledge, wherever and however acquired, development and training of the powers of concentration and application, is the best, in fact the only, foundation upon which to build special or technical training. After this comes the willingness to persevere in the effort to accomplish something for the purpose of accomplishment, the ambition to do whatever is to be done and whatever is undertaken and do it right. Without this preparation and training, failure is absolutely certain."

Obviously, then, the thing to do is to make every effort to continually improve upon one's education and training, if the top is ever to be reached. No escalator can carry one to the heights of achievement. There must be effort. Without effort, without struggle, nothing worth while will be achieved even by the well-educated and those heavily endowed with talent. Many a brilliant, well-educated man has slumped down and out because he was unwilling to make the effort or continue the effort after a first success.

"Useful accomplishment," James J. Hill once said, "is always the result of persistent toil. Nothing worth while is accomplished suddenly. Buildings are constructed brick by brick, and fortunes are accumulated dollar by dollar."

Fortunately, the man of effort and "stick-to-it-iveness" can very materially increase his own value by reading, thinking, studying, and learning; in other words, by training and education.

When a fellow-worker is suddenly promoted, it may not *really be sudden* at all when you stop to think about it; he has probably been "plugging" away for years, creating for himself one opportunity after another, all in preparation for the big opportunity when it should arrive. It is men with brains and with energy to use them who make opportunities. And having created them, these men profit by their creation because they have fitted themselves to make the best use of the opportunities created regardless of circumstances.

"Circumstances!" exclaimed Napoleon, "I make circumstances." The average person thinks he is lucky if he can grasp the opportunities that circumstances afford him. Opportunity is an illusive creature, but the persistent, ambitious telephone employe, or aspirant thereto, will train himself to find a way to make circumstances afford him opportunities. He realizes that without training he must wait patiently, and often in vain, for opportunity to knock.

Opportunities and facilities to fit one's self are far more plentiful today than 50 years ago. The advertising pages of this and other reputable magazines frequently mention them. The man who does not avail himself of every reasonable opportunity to go forward is doing himself an injustice. The student who is not improving his ability to study, to learn, to reason, and to remember, is going backward. One cannot stand still.

How to Get the Most Benefit from Study Efforts.

To obtain the greatest benefit from his efforts to study, the student should understand not only the purpose of his efforts, but also some of the requirements of successful study.

In having decided upon a course or system of reading, the student has indicated a desire to learn; but many students, unfortunately, do not know *how to learn*. The purpose of this article, therefore, is not only to familiarize the student with the requirements of successful study, but also to give him a few fundamental principles that will enable him to think logically for himself.

This article should show him the advantage of direct, systematic methods of thinking; it should help him to cultivate the power of recognizing, and the ability to apply, the basic principles underlying a problem; it should help him acquire skill

in applying the general principles discovered in one problem to another problem similar in idea, but different in setting; it should help him acquire the habit of forming opinions based on facts; and should, because of the definite knowledge he has gained, aid him in developing initiative than which few things, if any, are of greater importance.

Far better results will be obtained if the student opens a book or enters upon a course of reading or study with the proper mental attitude. His attitude should be one not of indifferent, haphazard thinking, but of courage; he should be firm in his determination to accomplish his purpose. With such attitude he may begin at once, realizing that it is the energetic *thinkers* who have the most ambition, the most enthusiasm, the most power, and who are the most willing to learn. It is the thinkers who solve the world's problems and receive the world's rewards.

To produce the best results, every mind needs regular, systematic and properly directed exercise. A sufficiently active mind is more likely to find solutions to problems and a way out of difficulties. It is often through difficulties that active thinkers learn the secret of victory. To overcome them they have had to reason things out.

The student should acquire and exercise his ability to reason, to form definite ideas. It is evident that facts or things cannot be thought about intelligently unless a definite idea is formed about the facts or things themselves. Reason should be brought to bear on everything under consideration.

Reason is said to be the highest of all the mental powers; it is that which distinguishes man from the lower animals. Some of the simpler acts of man are controlled by reason, but none of the lower animals have ever given indisputable evidence that reason has governed their actions. An animal may be trained to do many things a man can do, but if conditions governing the act change, the animal must again be trained; whereas, the man, exercising his ability to reason, readily comprehends the change and adapts himself to it.

A child is informed that five apples and four apples make nine apples. After being convinced of this, he will no doubt reason that four apples and five apples also make nine apples. He may satisfy himself fully that this is so by taking nine apples and arranging them in two groups, one of four apples and the other of five apples, and counting them. Similarly, the student somewhat more advanced will arrive at the conclusion that if a represents any number and b any other number, a times b is invariably the same as b times a.

The foregoing are very simple examples, but it is by a combination of such simple examples that the student arrives at and understands complex cases, and finally achieves the highest forms of reasoning. If the simple examples are passed over and others are not thoroughly understood, then the increasingly difficult ones are sure to give trouble. Let the student always be sure that he understands as far as he has read before proceeding further. It will be better to reason things out than to pass them by.

One of the most important objects of all education is to awaken and develop the student's ability to reason. The student who fails to apply his reasoning ability to that which his attention has secured and his memory has retained, has failed to profit by his reading as he ought. The student who uses his ability to reason has best learned to do the work of intelligent men.

When the student has finished this article, he will have learned some facts pertaining to the telephone business and its work—and better still, he should have learned much about how to study, how to think, and how to reason. The student who has done this has won "a pearl of great price," for all through a telephone life almost everybody at one time or another is confronted with situations which to master successfully require mental effort, and lots of it.

What the student gets out of a book, a course of reading or study depends directly on what he puts into it. His success will largely depend upon his own efforts. He must think for himself. He should reason things out. Even an instructor could not do that for him, and it is a good thing that he could not, for the mind of the student, like any other part of his body, develops only by exercise.

(To be concluded.)

Program for South Dakota's Annual Convention Next Week.

The arrangements for the 22nd annual meeting and convention of the South Dakota Telephone Association to be held at the Marvin-Hughitt Hotel, Huron, next week Tuesday, Wednesday and Thursday, January 10, 11 and 12, have been completed.

Reports of the officers and committees will give a concrete outline of the association's activities for the year. The addresses will suggest thought for improvement of existing conditions and the discussions will bring out information of particular value to the individual companies.

The program follows:

TUESDAY, JANUARY 10.

Meeting of officers and directors.

Opening remarks.

Welcome to Huron by the mayor.

Response to address of welcome, by Grant E. Preston, secretary, Western Farmers Telephone Co. Hitchcock.

Reading of minutes of the last annual meeting.

Reading minutes of executive committee meetings.

Secretary-treasurer's report.

Reports of standing committees—legislative, tax, public relations, traffic, co-ordinated interference.

President's address by Ira S. Burnett.

Appointment of convention committees.

Motion pictures.

WEDNESDAY, JANUARY 11.

Address by John H. Agee, general manager, Lincoln Telephone & Telegraph Co., Lincoln, Neb.

Address by Dawes E. Brisbine, member, South Dakota Board of Railroad Commissioners, Pierre.

"Telephone Accounting." Discussion led by H. A. Hanson, statistican, South Dakota Board of Railroad Commissioners, Pierre, assisted by G. A. Anderson, auditor, Dakota Central Telephone Co., Aberdeen.

Address by T. H. Null, attorney, Huron.

"Commercial Problems." Discussion led by M. E. Guinter, district commercial manager, Northwestern Bell Telephone Co., Sioux Falls.

Playlet, directed by Miss Anne Barnes, special traffic representative United States Independent Telephone Association, Des Moines, Iowa.

Report of the nominating committee.

Election of officers.

Motion pictures.

THURSDAY, JANUARY 12.

"Use of Highways by Wire Companies" by A. L. Turner, foreign wire relations engineer, Northwestern Bell Telephone Co., Omaha, Neb.

"Plant Problems." Discussion led by A. W. Huntzinger, chief engineer, Dakota Central Telephone Co., Aberdeen.

Convention committee reports.

"Other Conventions I Have Attended" by Secretary-Treasurer Thomas Phalen.

Unfinished business.

Discussion of association activities.

Community singing will be in charge of Jay Houghtaling of St. Paul, Minn., and during the banquet by Wm. Saltmarsh, district manager, Dakota Public Service Co., and his entertainers will furnish diversion.

Telephones Yuletide Greeting from London to California.

For the first time in the world's history, Christmas greetings flicked through the air over the Atlantic on Christmas day when Mrs. McRae Temple spoke to the veteran publisher, Col. Milton McRae, in San Diego, Cal., from the Savoy Hotel in London.

The colonel and his two grandchildren sent greetings over a span of 7,000 miles, one of the longest distances over which the human voice has traveled on a commercial circuit. The transatlantic telephone had the busiest day since its inauguration, according to reports from England, large numbers of Americans in London talking with friends and relatives back home.

Some Principles of Transpositions

Crosstalk and Properly Placed Transpositions—Electrical Relations Between Wires of Phantom Group—Induced Currents—Types of Tranpositions and Discussion of Uses—Accuracy of Transposition Points Essential for Best Results

By B. C. Burden,

Lincoln Telephone & Telegraph Co., Lincoln, Neb.

The study and development of transposition practice began in 1886 and has been carried on to the present time, so that little more could be desired in the way of improved design unless it would be a section that would give the same balance with fewer transpositions.

The design of well-balanced transposition sections is extremely complex, and specially-trained experts of our large research companies have spent several years in the design of single sections. While the mathematical computations in the design of a multi-circuit lead is rather involved, yet the underlying theory is based on simple, well-known electrical laws.

Crosstalk, which should be understood as due to telephone circuits inducing current in adjacent telephone circuits, rather than interference from outside sources such as power or signal wires, is caused by a magnetic and capacity coupling between adjacent circuits on the same lead. Transpositions, when properly placed, create such phase relations that the induced currents cancel out, or neutralize.

The accompanying sketches tend to point out the electrical relations between the wires of a phantom group. These sketches show the inductive effect due to both magnetic and capacity coupling.

Capacity and magnetic effects are different manifestations of electrical induction but result in the same effect; that is, the direction of their induced current is cumulative or in the same direction. The capacity and magnetic effects are considered as lumped quantities for clearness, and only the resultant effect of immediately adjacent wires is considered.

An explanation of Fig. 1 will bring out the underlying facts and should enable anyone to apply the same reasoning to any other combination in determining inductive relations.

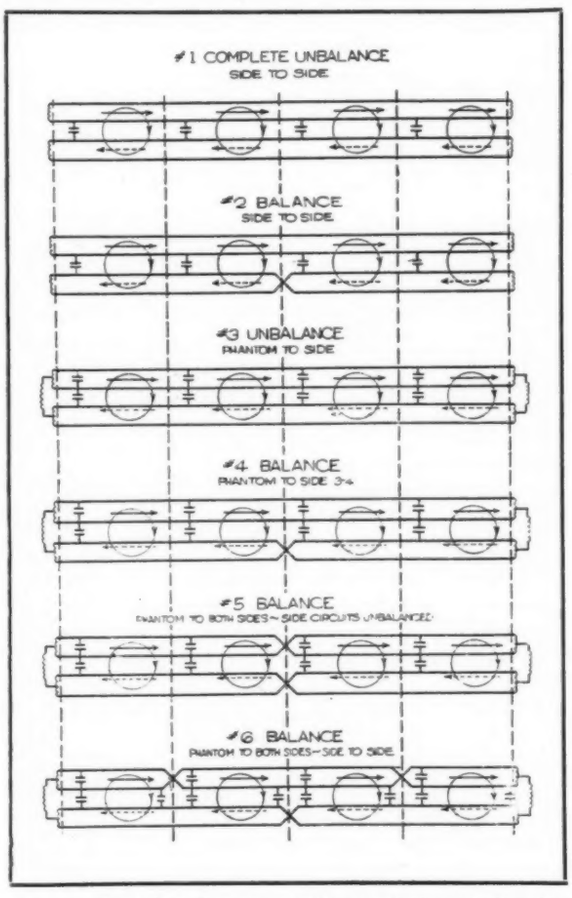


Fig. 1. Electrical Relations Between Adjacent Circuits.

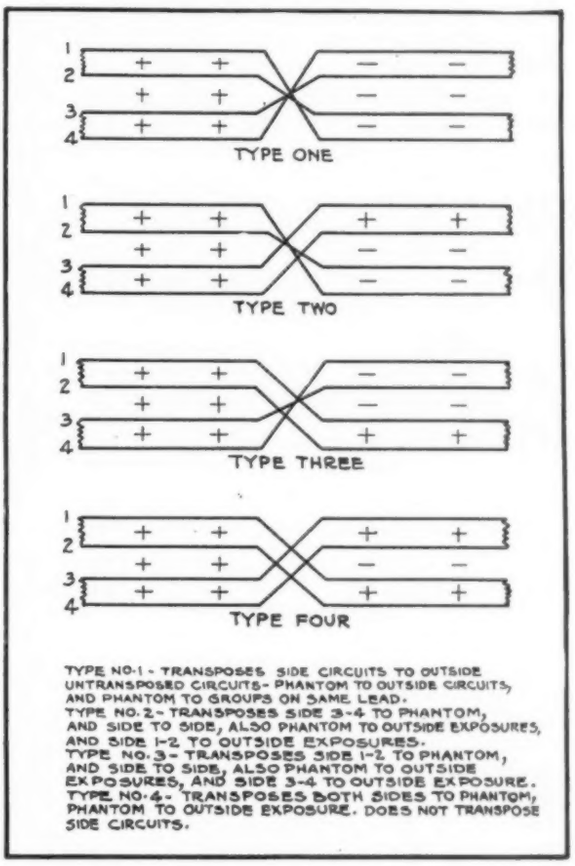

1
2
3
4
TYPE ONE
TYPE TWO
TYPE THREE
TYPE FOUR
TYPE NO. 1 - TRANSPOSES SIDE CIRCUITS TO OUTSIDE UNTRANSPOSED CIRCUITS - PHANTOM TO OUTSIDE CIRCUITS, AND PHANTOM TO GROUPS ON SAME LEAD.
TYPE NO. 2 - TRANSPOSES SIDE 3-4 TO PHANTOM, AND SIDE TO SIDE, ALSO PHANTOM TO OUTSIDE EXPOSURES, AND SIDE 1-2 TO OUTSIDE EXPOSURES.
TYPE NO. 3 - TRANSPOSES SIDE 1-2 TO PHANTOM, AND SIDE TO SIDE, ALSO PHANTOM TO OUTSIDE EXPOSURES, AND SIDE 3-4 TO OUTSIDE EXPOSURE.
TYPE NO. 4 - TRANSPOSES BOTH SIDES TO PHANTOM, PHANTOM TO OUTSIDE EXPOSURE. DOES NOT TRANSPOSE SIDE CIRCUITS.

Fig. 2. The Four Types of Phantom Transpositions.

The capacity coupling effect betweent wires is represented by the lumped capacity symbol similar to that used for a condenser, and the magnetic effect by the circle linking the two wires under consideration. The solid arrow represents the direction of instantaneous current flow in the inducing circuit, and the broken line arrow represents the induced current and its direction.

Sketch No. 1, at the top in Fig. 1, shows that the induced current in any of the four unit portions of the line will be in phase, and that complete unbalance will result and hence large crosstalk. In the consideration of the magnetic coupling it is necessary to merely assume a given direction of current flow in the inducing circuit, and then by Lenz's law determine the direction of current flow in the induced member. The capacity effect, while a different manifestation, results in the same effect, i.e., its induced current is in phase with that created by magnetic coupling.

Sketch No. 2, shows the effect of a transposition at the mid-point of one of the lines. It will be noted in this case that the induced current in the separate halves of the line will be 180 degrees out of phase and will, therefore, cancel out, and no crosstalk will result.

Sketch No. 3, shows how unbalance is created between phantom and a side circuit. Here it is necessary to consider the solid line as the phantom current, and the broken line as the induced current in one of the side circuits.

It should be noted that transposing the side circuit, which is considered for the instant as carrying the phantom current, will not result in a phase neutralization, inasmuch as the current carried is in phase in both of these side circuit wires. However, if transpositions were placed in both

side circuits, then the phantom would be balanced to the sides, but the side circuits themselves would be unbalanced. Hence it is necessary to arrange the transpositions so as to get a complete balance between phantom and sides and side to side. This is shown in Sketch No. 6.

Phantom transportations would not be necessary were only the phantom group itself to be considered, but exposure to outside lines, such as power, other telephone circuits, etc., make it necessary to throw or transpose the two sides of the phantom.

Because of the ease with which it is apparently possible to balance out induced currents, in the accompanying sketches, one should not form the conclusion that the same facility would be possible in a 40-wire lead. The complexity of transposition schemes increases ten-fold with the number of circuits. This is brought about by the necessity of transposing every circuit against every other circuit so that complete balance exists.

If it were positively known that a pole lead would carry only one phantom group throughout its life, it would be possible to design much simpler transposition schemes. Present-day practice of the larger companies contemplates the transposition of all circuits in accordance with a standard scheme which permits the later addition of any number of circuits. Standard schemes for 10 to 80-wire leads should be accepted as they are, for they represent a vast amount of specialized effort impossible of duplication by ordinary methods.

The transposing of telephone leads between towns is done by means of so-called "sections." These consist of a standard predetermined scheme calling for certain transpositions at regular intervals, usually 32 per section; their length is from one to eight miles, and they are perfectly balanced on the ends.

There are two types of transposition—physical and phantom. There are four types of phantom transposition, Fig. 2, known as 1, 2, 3, 4. Phantom transpositions are necessary because of the fact that a pair of wires is virtually the equivalent of a single conductor, and to get the effect of a transposition it is necessary to change circuit positions.

By a systematic adding or subtracting of positive and negative signs which are used as arbitrary designations of phase of induced current, it is possible to determine when balance exists or to enable one to see what transpositions are necessary to balance an unbalanced line.

By reference to Fig. 2 it will be noted that each small unit is either positive or negative. This assignment is made by starting at the left-hand end of a circuit and giving the first exposure a positive sign and alternating or changing sign as each transposition is passed. This applies to both phantom and physical circuits. The basic theory of this arbitrary assignment of signs is to bring out the phase relation existing in different units of the line.

Now, taking any two circuits, the signs of each unit section should be considered carefully, and the unlike signs added and enumerated as negative and the like signs as positive. Perfect balance is indicated by an equal number of plus and minus signs. This is a vertical addtion of signs. Transpositions should be so placed that the plus and minus signs are equal or nearly so.

It might seem, in the preliminary consideration of two circuits, that one transposition at the midpoint of one of them would provide a theoretical crosstalk balance. There are, however, three effects that make more frequent transpositions necessary. They are: Attenuation (weakening), phase change of voltage and current, and the effect of outside power circuits.

It can be readily seen that, if the voice currents are attenuated as they pass over the line, and if the line is of considerable length, the opposing voltages built up by virtue of transpositions will not fully cancel or neutralize current of opposite phase because of the difference in magnitude.

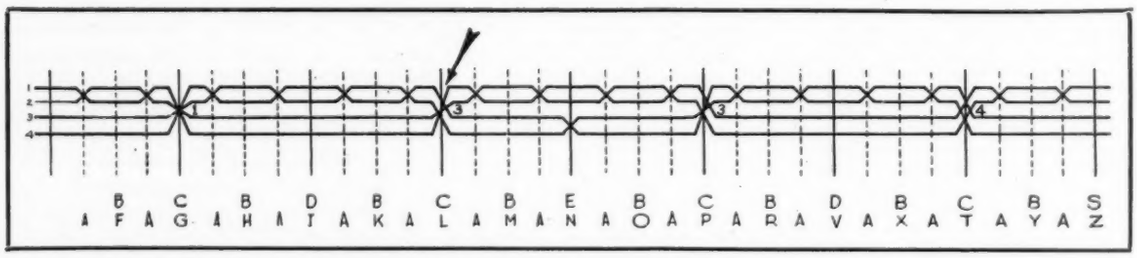


Fig. 3. Sketch Showing That Large Unbalance Would Be Created by An Error in Making Wrong Type of Phantom Transposition.

phase change. Power circuits, because of irregularities, etc., would induce currents of different voltage in unit sections of the lead and unbalance would result, so these factors must be considered in designing simple transposition schemes. The advantage of thoroughly understanding transpositions and being able to design or balance leads with only a few circuits, is not to be ignored.

Many small Independent companies have ample opportunity to phantom existing

The same reasoning also applies to grounded lines and to provide metallic service in place of grounded, thus doing away with the deplorable amount of crosstalk that exists on most grounded lines. A thorough knowledge of transpositions is necessary to provide balances between the circuits made metallic, unless some standard transposition scheme is followed.

It is usually considered as hopeless to attempt to reduce crosstalk on grounded circuits. There are, however, some possibilities present along this line. For example, where long parallel feeds exist, it is theoretically possible to secure some balance by inserting repeating coils at the midpoint of the lines in question, the coils being so connected as to reverse the direction of instantaneous current flow of the line with respect to ground.

While this is not a very practical method, yet for those experimently inclined it might offer a means to reduce economically crosstalk on long parallel farm leads of three or four wires.

The question may arise: "Why worry about transposition theory when perfectly-designed standard schemes for transposing any number of wires are available?"

Aside from the natural satisfaction in knowing the basic theory of the things around us, there is ample opportunity for using this information, especially in the Independent field, where it is desired to balance small, unimportant iron wire leads, at a minimum cost. By following certain fundamental rules, it is possible to design balancing transpositions to fit the case in hand, which provide a degree of balance that is amply satisfactory for the less important circuits and farm lines.

In closing, I wish to point out the necessity for extreme accuracy on important leads, both in the making of the transpositions and in the chaining of the section. That even a single error may result in excessive crosstalk is evinced by Fig. 3. This shows the transpositions on the top arm of an eight - mile section. Merely changing a type 3 phantom transposition to a type 4 transposition at the point indicated by the arrow would result in high unbalance between circuit 1-2 and the phantom.

Prices in the Metal Markets.

New York, January 3.—Copper—Firm; electrolytic, spot and futures, 14.00@ 14.12c. Tin—Quiet; spot and nearby, $57.75; March, $57.62. Lead—Steady; spot, New York, 6.50c.

Here and There in Telephone Work

Practical Notes for the Maintenance Student.

By J. A. Bracken.

[Author's Note.—The purpose of this and subsequent notes is intended to help student workers in plant maintenance to become more familiar with the principles of natural phenomena, electricity, and magnetism, all of which are of vital importance in the proper operation of a telephone system.]

Communication is the means by which man has learned to live with his neighbor. Without the ability to speak, write and read, man would undoubtedly find it necessary to live alone, for he could not hope to learn from others, nor could he give his ideas to others. Through many centuries there have developed gradually various methods of communication culminating in the telephone.

Today, the average person finds telephoning a relatively simple process. He is connected through the necessary equipment, either mechanically or by an operator, to the called party. When the conversation is finished, the parties hang up their receivers on the hook again and the connection is cleared. The telephone user is not required to know anything of electricity and magnetism, or of the mechanical principles that govern the operation of the telephone apparatus. The operator who completes the connection is required to know much more than the subscriber about the operation and of the principles of the apparatus involved.

This is very well for the subscriber and the operator, but those in the plant department whose duties consist of installing and maintaining the subscriber's station and central office equipment, should know about electricity and magnetism and how to apply them properly together with the mechanical principles that govern the operation of telephone apparatus.

In the telephone industry, as elsewhere, many changes are constantly altering the relation of the plant worker to his job, especially in new equipment. Of course, every one engaged in plant work has a desire to keep abreast of these changes and to be able to understand the operation of the most complicated telephone circuits and mechanisms developed.

Some, however, fail to appreciate the necessity of a thorough knowledge of the fundamental principles of magnetism and electricity, as applied to telephone equipment. Even though one may have mastered these principles during the past, there is a tendency after the lapse of a few years, during which one naturally engrossed with every day duties, becomes somewhat "rusty" as regards the technical details, and it is to provide the basis of such information that these notes have been prepared.

In order to reap full benefit from a course of reading, there is need, first of all, of a certain background of experience or contact with the realities dealt with. To be able to interpret just the printed page bearing upon telephone subjects demands acquaintance with actual operations upon which the imagination may build.

To trace a circuit and its operation one must understand something of the laws governing the flow of electric current. To adjust a ringer, a relay, or other apparatus properly one should know something about mechanics and the effects of electricity and magnetism.

Many blunders in telephone maintenance practice are the results of a lack of this knowledge. No line of work demands a wider range of electrical knowledge than does practical telephony; but whether one acquires this range of knowledge by a course in electrical engineering, or by self-improvement through constant reading and study, he owes it to himself, to the telephone company, and to the customers' service, to prepare himself adequately.

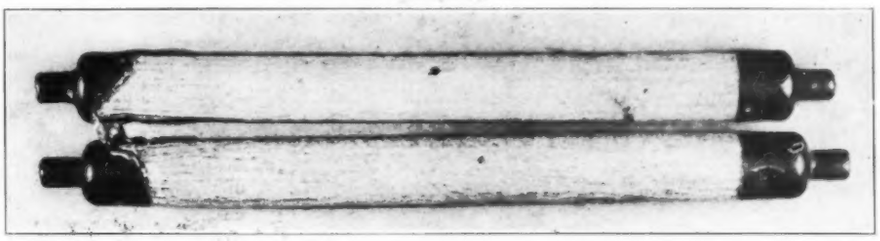
To keep informed as to everything that is going on in the field, one should read the best telephone journals and as many recent books relative to modern telephone practice as time will permit. A complete knowledge of the telephone system cannot, however, be gained by mere reading of books; actual contact with the equipment is very essential towards obtaining this knowledge.

These notes which are presented to you are designed with two distinct purposes in mind. In the first place, due consideration is given to the needs of the student who desires to begin a course in reading in which he may lay a foundation to serve as a basis for the practical knowledge required in telephone practice and to prepare himself for future study with the ultimate purpose of becoming an expert through working with the apparatus.

In the second place, these notes are planned to give the plant employe who has a scientific turn of mind, an insight relative to the action of electrical and magnetic forces which will enable him to understand better the principles of the telephone.

It is commonly but erroneously supposed that the study of these principles is essentially a mathematical study. That this is an error is shown by the fact that some of the greatest workers in the field of telephony have not been skilled mathematicians.

It follows that any part of the natural phenomena of the universe, such as electricity and magnetism, is subject to the common laws of mathematics. Consequently, any deep-seated study of electrical processes must involve a knowledge at least of a certain amount of mathematics, but the fundamental truths and laws of electricity and magnetism do not necessarily require mathematics for their expression.



Cable Box Fuses Which Were "Shorted" by Lightning.

Terminals of Cable-Box Fuses "Shorted" By Lightning

The accompanying illustration shows two cable-box fuses which were melted together by lightning. "The fuses were in the same cable pair and the lightning apparently shorted across them, fusing them together," writes Roy L. Cline, district traffic chief, Southwestern Bell Telephone Co., Joplin, Mo., in sending in the photograph.

Takes Prospective Operator Down in Well to Test Nerves.

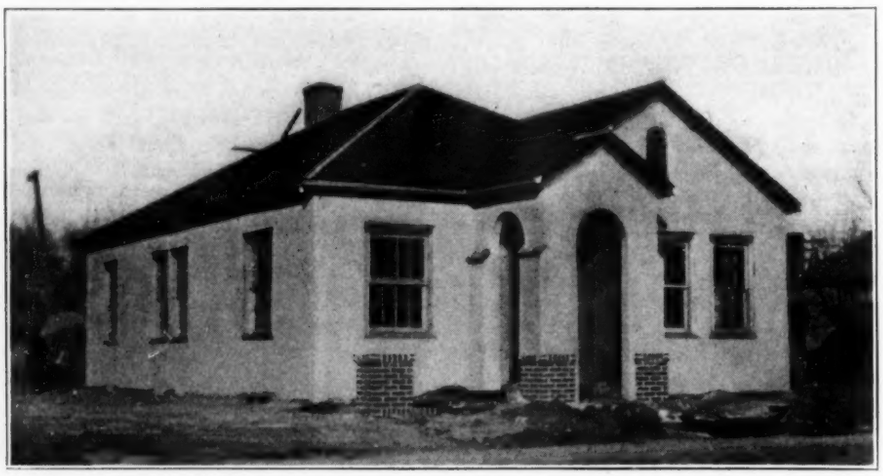
A unique method of testing the nerves of prospective telephone operators has been found by E. B. Danielson, manager of the United Telephone Co. at Goodland, Kans. He recently took Miss Iris Connell, an applicant for a position, down to the bottom of a 150-foot well. Finding that she still remained perfectly calm, he offered her a position as student operator and she accepted.

Several of the Goodland operators have recently descended into the well. The trip down is made in a large bucket in which there is only room for two. On the same day that Mr. Danielson and Miss Connell made their descent, Miss Audrey Clark, chief operator, and Mr. Cox, city

engineer, also went down together. But Miss Connell has the distinction of being the only operator who accepted her position while 150 feet underground.

New Exchange Building with Outside Walls of Stucco.

The Lincoln Telephone & Telegraph Co. has just completed its new building at Cedar Bluffs, Neb., of a design that is pleasing and unusual. It is located in a desirable part of the business section, and is of standard type so far as the interior



New Stucco Exchange Building Erected at Cedar Bluffs, Neb., by the Lincoln Telephone & Telegraph Co.

is concerned. It is one story and basement, the outside walls of stucco and the interior finished in natural colors.

The front portion will be occupied by a large lobby, commercial office and switchboard. Directly off this room will be located other central office equipment, and the remainder will be equipped for living quarters, modern in every respect, for the chief operator, who will reside in the building. A modern heating plant is in the basement. An open house affair is planned when the building is occupied some time in January.

The construction of the new exchange building is in keeping with the company's policy in two respects, that of owning all telephone buildings in the more important telephone centers, and of providing comfortable quarters for all the company employes, as well as furnishing adequate protection for the telephone equipment.

Tune Your Advertising to What You Have to Sell.

By Frank H. Williams.

There's no doubt in the world but that the most effective advertising is the advertising that harmonizes perfectly with the things the advertiser is trying to sell.

For instance, when a manufacturer of vegetable soup uses colored advertisements carrying wonderfully attractive pictures of the fresh vegetables going into the manufacture of the soup, together with attractive pictures of the cans in which the soup is sold, the copy harmonizes splendidly with the goods that are being sold, and creates a desire on the part of the reader to buy the advertised goods.

Again, when an ice cream manufacturer puts up a building that looks exactly like an inverted ice cream cone and uses the structure as a store in which to sell ice cream and cones, he has a bit of outdoor advertising that attracts a great deal of attention and sells large amounts of his product because the advertising harmonizes perfectly with the things that are being sold. And it might be worth while to add that on the Pacific coast such buildings as these are selling tremendous quantities of ice cream.

It is evident, then, that if the telephone company can use advertising which harmonizes more closely with what it has to sell, the advertising will be more successful in getting more business.

But what is it, in the final analysis, that the telephone company has to sell?

It is communication. In other words, it is plain, old-fashioned conversation that the telephone company is trying to sell to the public. Why,. then, not harmonize the company's advertisements with its product by the use of conversationalized printed advertisements to a large extent instead of using simply the usual run of stodgy display advertisements that are used by drug stores, hardware stores, department stores and just about everyone else?

A great deal of sprightliness and entertainment could be injected into conversationalized telephone adverisements. Such advertisements might carry some such general heading as this:

"Telephone Conversations."

Under this heading could appear timely copy in some such style as this:

First Manufacturer (at the local Chamber of Commerce): "We put in a private branch telephone exchange about six months ago and it has been a real help to us in getting more business."

Second Manufacturer: "I can't see the use of spending money for a private branch exchange. We have some trouble, at times, in getting telephone connections quickly, but we are operating on as economical a basis as possible, and it looks to me like a needless expense to go in for a private branch exchange."

First Manufacturer: "Bill, you're all wrong. Your customers judge you by your telephone service. If your customers can't get quick connection with you, they cuss you instead of the telephone company, because they realize that they get quick connections with other manufacturers who have been wise enough to put in private branch exchanges. In other words, by not having adequate telephone service, you irritate your customers, create an impression among them that you don't care for their business, and probably do more harm in a month than the cost of a private branch exchange.

"Believe me, Bill, the manufacturer has to watch his step these days. He must demonstrate to the trade that he is absolutely up to date all the time, because the trade simply won't do business with antique concerns any more. And I figure that one of the best possible ways for a manufacturer to show his trade that he is right up to the minute all the time is by giving them the best there is in the way of telephone service."

Second Manufacturer: "Joe, I never thought of it in that light at all. I just looked at it as something needless the telephone company was trying to sell me. Believe me, I'm going to install a private branch exchange tomorrow."

Such copy as this would get a lot more attention than any ordinary display copy, for several reasons. In the first place, it would be entirely different from all the other advertising in the paper. You can look all through the average newspaper and not find any conversationalized advertising. In the second place, it reads easily. It's no effort to follow it through.

In the third place, it is humanized. It deals with real people; and, of course, the greatest interest of man is in his fellow man. So the advertising has a greater punch on that account. And in the fourth place, this advertising reads the way people talk and has a much greater punch accordingly than high-pressure, stilted copy.

Of course, there is no end to the themes that might be put across by the telephone company by the use of conversationalized advertising. Here, for instance, are some of the topics:

Actual reproductions of the selling talks that put across private branch exchange sales.

Reproductions of the sales talks that induced local firms to use long distance instead of letters.

Conversations between representatives of the telephone company and local private branch exchange owners, telling the latter how to get even greater benefits from the exchanges.

Conversations between company executives and employes, showing the high ideals which the company instills into its employes.

And so on and so forth.

Harmonize your advertising to your business, Mr. Telephone Company Executive. You'll find it profitable to do so.

Special Telephone System Installed in Waterless Gas Holder.

The Pacific Gas & Electric Co. recently completed a new waterless type of gas holder which is 301 feet in height. Several times during the day a workman climbs to the top of the holder, enters the holder, and descends to the top of the piston to take check of the tar used in the tar seal construction and to see that other parts are working properly.

In order to enable this workman to keep in communication with the operator of the compressor station, three telephones have been specially installed—one at the compressor station operator's desk, one on the roof of the holder, and the third on the top of the piston which rises and falls within the holder as the volume of gas increases or decreases.

When the workman starts up the stairway leading to the roof of the holder, he notifies the compressor station operator. When he reaches the roof, he uses the telephone there and again notifies the operator. Then he enters an electrically-operated elevator which operates between the inside of the roof of the holder and the top of the piston where the tar seal apparatus is located.

On reaching the piston, the workman uses the telephone there and communicates with the compressor station operator. Special provision has been made for taking care of the slack in the telephone cable, which extends from the piston to the roof of the holder, as the piston rises and falls within the holder. This is done by means of a series of pulleys and weights arranged at a ratio of 16 to 1.

"The Last Call."

By N. E. Branson,

General Superintendent, Inter-County Telephone Co., Gallatin, Mo.

Those of us who are associated, and have to do with the operation of a public utility or corporation, meet many and varied experiences. Although many times these experiences are considered by us as only a passing event in our daily lives, nevertheless there are times when they become very significant in character. A most peculiar experience, which is especially so in the present age of living, is dealing with what may be termed "a groucher."

In the early days when our great utilities were first being promoted, there were many grouchers; men who never believed it necessary to make any changes in the mode of living. Anything brought forth to improve the art of living so far as they were concerned, would presently be a failure. A majority of this class of people has passed away, leaving only a small minority, which for the present may not be seriously considered.

These so-called grouchers are surely peculiar people. We find they seldom if ever take any interest in social affairs, and are against any and all improvements tending toward civic pride in the community in which they live, directing their forces against nearly all progressive ideas of human efforts.

They are always dissatisfied with prices which they must pay to secure the very necessities of life, while the merchandise they have to sell is never bringing enough on the market. It is only necessary to exchange a few words of conversation with them to find that everything is wrong; nothing is right in their opinion. Surely these people do not live in the spirit of the present day, and to the more progressive man or woman, they seem only barely to exist.

Those of us who are permitted to come into contact with this class of people, can easily draw an imaginary picture in our minds of the folly presented by this groucher, who in the by-gone days tried to prevent the building of some railroad; who tried to prevent obtaining of the right-of-way of this much needed utility because its future possibilities did not fit in with his imaginations.

Although all compensations had been made, or offered for damages directly or indirectly, and although the very life of the nation was waiting and depending upon the services of the utility, this groucher, in his narrow conception, even of his own needs, would try to put away such a service.

The railroad companies had many such obstacles of this nature to deal with in the early days. In a measure they had to force upon the people of this nation the wonderful transportation facilities it now affords. But the railroads have not been alone in being opposed in the fitting out of a service to meet the needs of the people, for we find these so-called grouchers in all departments of life's activities.

The telephone, like the railroads, has had its days with them, and despite their antagonism is now playing a most important part in our daily lives as a much-needed service. We can recall much of the early pioneer days and their activities in laying the foundation of a wonderful servant to mankind, until today there seems to be no limit to its possibilities; furnishing as it does, a most comprehensive system through which man is able to express his thoughts, his views, and his desires to his fellow man.

It provides a means whereby he may easily sell his merchandise or purchase goods, as the case may be. His grocer, his coal dealer, his family doctor, or the taxi, all come by way of the telephone, to say nothing of the extended service furnished to him into far and distant countries.

We have a picture of the man who says that he does not need a telephone, or does not use one (although he manages to steal a call every chance he gets) and says the service is rotten.

In many cases we find that this groucher is responsible for poor service rendered by the telephone company by refusing the lineman the privilege to trim even the smallest twig from a nearby tree, although the trimming may add to the appearance of the property as well as that of the tree, and at the same time permit the telephone company to render a better service to his neighbor.

What a pitiful condition this grouch must be in as compared with the more progressive and spirited elements of human societies. How little must be his conception of the world's needs and its possibilities! We wonder sometimes if he has ever stopped long enough to think that many of his life's necessities are brought to him by these two great utilities—ordered by telephone, and transported to him by the railroads.

And who knows, or who can tell, but in all probability the telephone will be used to call his friends and relatives, as well as the undertaker to place him in a casket, and the railroads transport them to his late residence. And although this may have been the only call made for him during his entire lifetime, it is also the last call.

New Telephonic Cables Placed in Service in Belgium.

The Belgium administration of telegraphs and telephones has recently opened the Brussels-Mons, Brussels-La Louviere, and Brussels-Charleroi underground telephone service, Assistant U. S. Commercial Attache Leigh W. Hunt, Brussels, reports. Trials have given the best results as to the intensity and the clearness of communications. In addition, the number of circuits is such that communications can be had with practically no delay.

The opening of these new cables will permit business men of the southern coal basin of Belgium to obtain rapid and clear communications through Brussels with foreign countries, notably England, Germany, Austria, Hungary, Denmark, Sweden and Norway. Direct communications with Holland will be available in a short time, and also with various parts of France. Telephonic service with the United States will also be opened in the near future through the wireless telephone station of Rugby, England.

In view of the remarkable success of the wireless relations with America through the Balradio post at Ruysselede, the ministry of foreign affairs, has invited Belgian embassies and legations abroad to use this service in their communications with Belgium.

The Why and Wherefore of Televox

Televox Developed to Supplement But Not Supplant Supervisory Control Systems Which Have Come Into General Use in Power Plant Operation Last Few Years—Theory of Televox and Description of Apparatus—Illustration

By R. J. Wensley,

Switchboard Engineer, Westinghouse Electric & Manufacturing Co.

Unleashed by the sight of two mechanisms carrying on an animated telephonic conversation with each other and executing orders delivered over the telephone, the vivid imaginations of the newspaper reporters and special writers have run riot and many remarkable and unexpected attributes have been thrust on the televox.

It is the purpose of this article to give the real and serious purpose back of this development. Even granting the theoretical possibility of such a device, it is not intended that a home model be put on the market with the ability to prepare soup when given the proper code of whistles over the telephone from the afternoon bridge club. But in all seriousness the device may make the preparation of the soup possible by enabling the power system dispatcher to reroute the supply of electricity so that service may be quickly restored to the electric range after a storm, fire or other disaster.

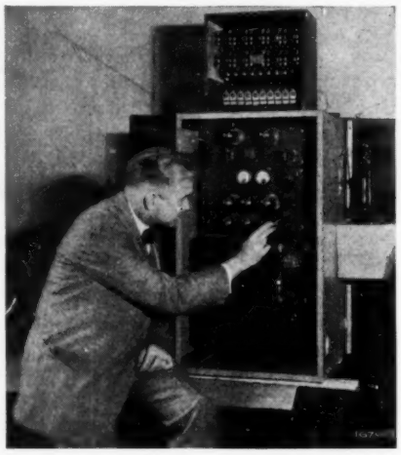
The televox was developed to supplement but not supplant supervisory control systems which have come into such general use in the last few years. The use of small distributing substations is becoming more and more the accepted method of supplying the electrical needs of large cities. To carry this plan to its logical conclusion, these stations must be unattended.

Wholly reliable means are available for the periodic reclosing of the local distribution feeders. It is not so simple to control the incoming high tension feeders which may form part of a ring or other complicated network. It is most desirable that the system operator be given some means by which he can issue instructions to the apparatus in the unattended stations and receive replies that his instructions have been obeyed.

For important or large substations where the expense is warranted, there is no better method than by the use of one of the available types of supervisory control. These systems require individual control circuits of from two to four wires. These wires may be specially installed for the purpose or may be leased from the telephone company. In either case there is considerable expense involved.

For the more important stations this expense is fully warranted, but for the lesser stations the tendency among many power companies is to take a chance and depend on quick transportation to get a man to the station after an outage. If a man were actually in the station, the solution would be quite simple. The dispatcher would pick up his telephone, call the substation and order certain breaker movements. But, as we have already stated, these stations are too small to justify human attendance; hence the telephone is useless.

The public telephone systems have been brought to a high state of perfection. Recent improvements in operating technique have greatly speeded the connection time



R. J. Wensley Explains Action of the Televox Instrument Which Carries on Telephone Conversation.

of the Bell system. In spite of the time-worn jokes regarding the slowness of the exchange operators, it is now a matter of common comment that connections are secured with an accuracy and speed that leave but little to be desired.

With this great and reliable means of public communication available in every corner of our cities and towns, it seemed a pity that it could not be used for the purpose of controlling these small, unattended stations. If there were only a machine with sufficient intelligence to answer the telephone and carry out a few simple instructions and give some replies, the problem would be solved.

In response to this need came the televox. This is literally a machine endowed with enough apparent intelligence to carry on a conversation over a standard telephone through exchanges and their connecting cables in exactly the same manner as would a human operator, were such available. This device must not transgress the rules laid down by the telephone companies regarding attachments to their lines or instruments.

Every effort is put forth by these companies to maintain their service at a high degree of efficiency. This could not be done were unauthorized persons permitted to make changes in the electrical circuits or the telephone instruments themselves. The telephone companies' very rigid but justifiable restrictions, therefore, made it necessary that the televox actually "listen" to the receiver and "speak" into the transmitter.

The standard telephone systems provide channels which will carry all frequencies between 300 and 2,800 cycles with a reasonably small attenuation. The operating tones or "voice" of the televox must stay within these limits. For the first sample, which is the one that has received such wide publicity, tones corresponding to 600, 900 and 1,400 cycles were chosen.

It will be noted that the upper frequency falls between the second harmonics of the two lower frequencies. This is necessary to prevent possible false operation, due to the harmonic operation of the amplifier for the higher frequency, should this be a multiple of one of the lower frequencies.

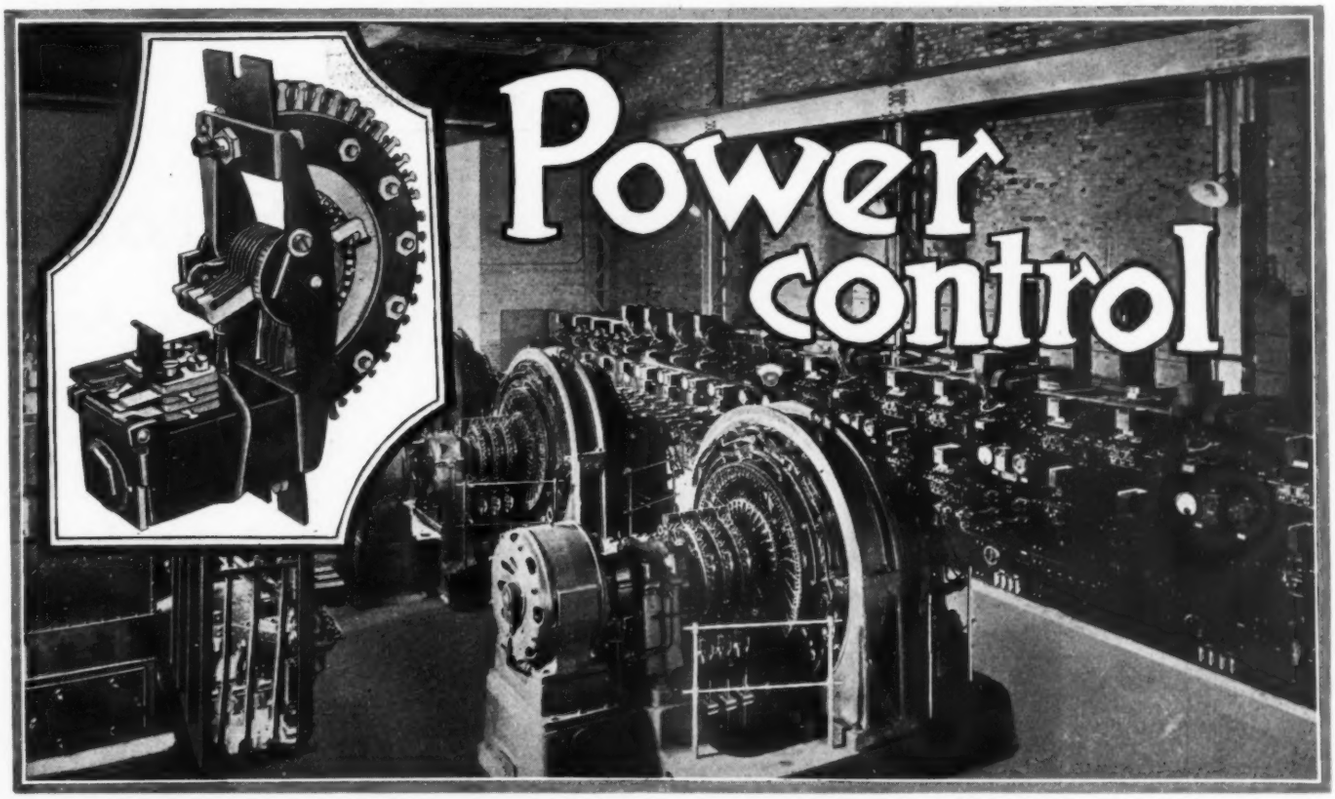
The first model, described in this article, is an experimental device and is necessarily crude. It in no way exhausts the possibilities in this new form of control.

The dispatcher's equipment consists of three tuning fork oscillators, a two-stage audio amplifier, a loudspeaker unit and three push buttons. The standard desk telephone is placed on the desk in front of the loudspeaker unit.

At the substation there is a larger cabinet which contains a two-stage amplifier, three ladder-type filters and three individual frequency amplifiers. Relays in the plate circuits of the output tubes in these final amplifiers operate the selective portion of the equipment. A set of telephone relays and selector switches comprises the selective equipment.

On the side of the box is a shelf on which the standard desk telephone is placed. The receiver is left off the hook and is placed on a microphone which forms the electrical "ear" of the unit. A weighted arm projects from the side of the box to depress the hook switch on the telephone. This is arranged to be lifted by a magnet inside the cabinet.

The telephone may be lifted from the shelf and used in the ordinary manner without the necessity for detaching or disconnecting any device. When finished with its use as an ordinary telephone, the in-



IN the Supervisory Control of Automatic Power Substations "Strowger" Mechanism performs a vital service.

Responding to electrical impulses, transmitted over a telephone circuit from the distant Control Room, the Strowger Rotary Switch is utilized to operate the various circuit breakers and alarm devices.

It will be realized that reliability is the keynote of such an important service; hence the selection of "Strowger" for this duty.

Upwards of 3,500,000 Strowger Automatic Telephones installed or under construction throughout the world

Strowger(s)witchcraft

ATM

Automatic Telephone Manufacturing Company, Ltd.

Strowger Works, Milton Road, Liverpool, England

Associated Company—International Automatic Telephone Company, Ltd., London, England

Maintaining Strowger

Progressive Assembly

In the progressive assembly while every facility is up assembly process, each sub careful scrutiny of inspect unless it satisfies the ma ing standards of consis performance.

STROWGER

ertomatic Supremacy---

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THE accompanying illustration shows one of the switch assembly lines in the factories of Automatic Electric Inc., where selector and connector switches start at one end as bare frames and emerge at the other as practically complete switches. The various component parts which are mounted to the frame are fed to the operators by means of gravity rollers from assembly tables, where they in turn have been assembled. Because of the specialization of each worker upon one particular operation, this method insures greater uniformity of product together with increased speed of production, resulting in lowered costs.

This method of progressive assembly, which has been applied with great success in the automobile industry, has been used in various phases of Strowger Automatic equipment manufacture for many years with the highest satisfaction. It represents but one of the many improved production methods which have been worked out over a period of years by the efficiency experts of Automatic Electric Inc., who always have had as their object the ultimate lowering of cost to the purchaser, in addition to constantly maintaining every element of quality and performance for which this equipment is noted.

[This is one of a series of advertisements illustrating the exacting care exercised in the production of Strowger Automatic telephone equipment, which is thus kept constantly in advance of the telephone art.]

Automatic Electric Inc.

Factory and General Offices: 1033 West Van Buren Street
Chicago, U. S. A.

Sales and Service Offices in All Principal Cities

RAUTOMATIC

strument is replaced on the shelf and is immediately in readiness for automatic operation.

All language is but a succession of sounds, strung together in various combinations. As there are but few operations to perform, the language need not be complicated. The three frequencies before mentioned are used as three monotone syllables, and all the various commands are translated into a language composed of these. This might be called "televoxanto," with apologies to Esperanto.

Let us vision a scene in the dispatcher's office of a central station equipped with the televox.

The telephone rings. "Dispatcher speaking."

"This is the service department. We have three calls from 26th and Y streets."

"All right. We'll investigate and call you back."

The dispatcher hangs up and turns to his system map. "Let's see. That will be feeder 16-S-5 out of Sub 16."

The dispatcher consults his telephone index and picks up his telephone receiver. "A line please," this to the private branch operator.

"Number, please?"

"Valley 6000."

"Thank you, ——— 6000."

And then the dispatcher hears in the telephone receiver, "Buzz—buzz-buzz-buzz-buzz-buzz-buzz," which translated from televoxanto into English says "This is the televox at substation 16 speaking. What can we do for you?"

The dispatcher places his telephone in front of the speaker unit on the front of his televox cabinet and pushes the button marked 1400 five times. The loudspeaker says "Tweet-tweet-tweet, tweet-tweet," which says to the substation, "Connect me with breaker No. 5 and tell me if it is open or closed."

And then the buzzer at the substation buzzes out the information that breaker No. 5 is open. The dispatcher pushes the button marked 900 and the loudspeaker says "Toot," which is short for "Close it." The buzzer then says that the breaker closed, but opened again almost immediately. "Close it again." This time the buzzer says that the breaker stays in.

The 600-cycle button causes the speaker to say "Whoop," which is the way the televox has of saying "That is all. Goodbye." The substation hangs up; the dispatcher hangs up, but immediately calls the service department and asks them to call the persons making the complaint to see if service has been satisfactorily restored, also to send out a man to patrol the line and locate the trouble if possible.

An ordinary ringing signal relay of the type used for operating special loud gongs or signal devices is installed by the telephone company and furnishes the initiating means for the rest of the substation equipment. The relay makes contact when the bell rings, thus energizing the magnet which lifts the weight from the hook switch and completes the circuit to the amplifying tube filaments.

After an interval of about 30 seconds, during which the substation buzzer sends out the station code at intervals, the actuating circuits will be opened by a timing device unless the dispatcher sends one or more 1,400 cycle tones. This is to take care of wrong number calls which are inevitable as long as human beings use the telephone.

J. G. Larsson, Swedish Engineer, and His Telephone Message Recorder.

For portable use, the device can be operated by three carefully-tuned pitch pipes of the proper tones. This enables the line repairman to operate the substation breakers from any telephone in private houses or pay stations near the case of trouble. Testing of defective circuits is thus greatly expedited.

Means are available for reading meters, ascertaining the height of water in reservoirs, reading the temperature of transformers or other devices, or in fact doing almost anything that needs to be done in the controlling of a distant substation.

Inquiry is frequently made as to the possibility of interference from the high frequency tones used in the televox. A little reflection will reveal the fact that the tones used are within those normally used in voice transmission. The volume is limited by the ability of the telephone transmitter to convert sound into electrical vibrations.

The televox, therefore, will not create any interference unless the circuit is so bad that crosstalk exists during ordinary conversation. This condition is not allowed to continue very long after the telephone company learns of it. And so we can answer with entire confidence that the televox will not cause any more interference than ordinary conversation.

There will be many uses for televox that are not apparent at this time. There must be many places where inexpensive remote control would fill a real need were the expense of control circuits eliminated. Such applications will undoubtedly develop as the capabilities of the televox become better known.

Telephone Call Recorder of Swedish Engineers Demonstrated.

An invention of two Karlskrona, Sweden, engineers, MM. Vogel and Larsson, consisting of apparatus which, in the absence of the owner, receives and registers telephone communications, has been fundamentally reconstructed and tested for a year with, it is said, the best results.

A demonstration was recently given of the apparatus before representatives of the press and the Swedish Telegraph Board, and communications were clearly and distinctly repeated.

Mr. Larsson recently arrived in the United States to demonstrate his apparatus before American telephone officials.

New York and Los Angeles Now Directly Connected.

Two direct long distance circuits between New York City and Los Angeles, 3,273 miles in length, and the longest direct telephone circuits in the Bell system, were opened for service on December 21.

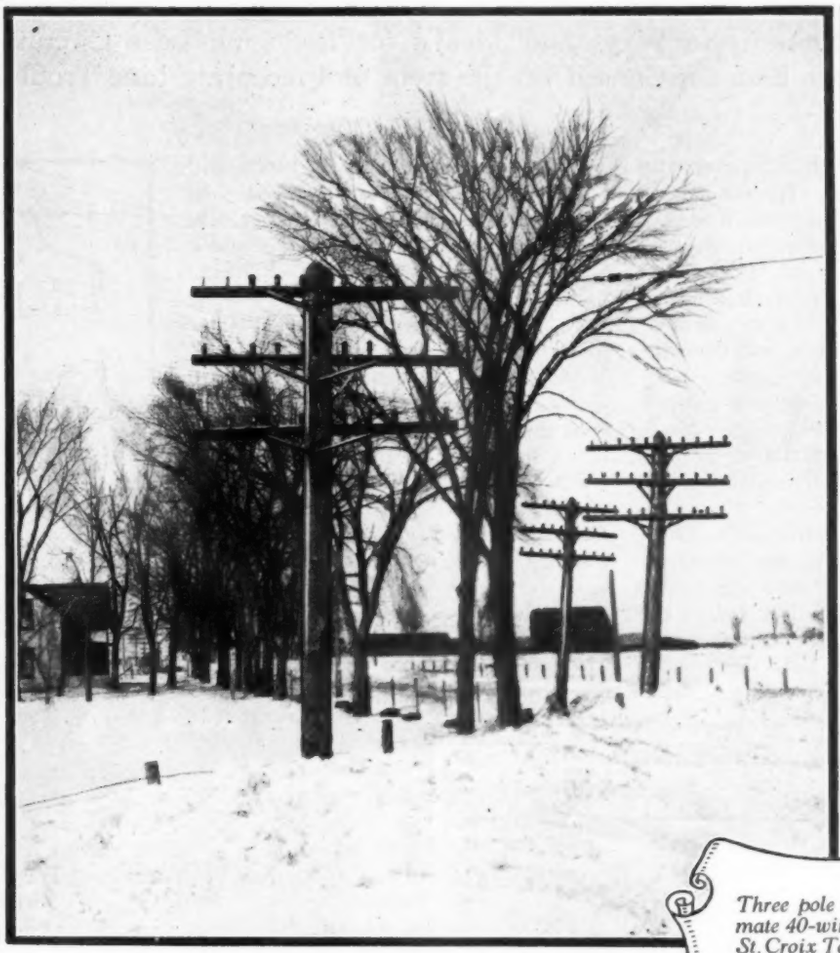
The term "direct circuit" means a pair of telephone wires extending between two points. The effect of the placing in service of the direct circuits eliminates the necessity of switching calls between the two coasts at Chicago as the present time; the calls over the new direct circuits now being completed between the Atlantic and Pacific coasts with the assistance of the New York and Los Angeles operators only.

Along the route of this new transcontinental direct circuit between New York and St. Louis, telephone repeaters have been installed at Harrisburg, Pittsburgh, Cleveland, Toledo, South Bend, Chicago, Peoria and St. Louis. Between St. Louis and Los Angeles the new direct circuits are fed by the repeaters of the southern transcontinental telephone route. Terminal repeaters have also been installed at New York and Los Angeles.

Over these two new circuits, according to the estimates of telephone engineers based on traffic in the past between these two points, a daily capacity of 99 calls of average length of conversation can be taken care of. The present daily average of 51 calls direct between the two terminal points and 14 calls from points in adjacent territories on both the Pacific and Atlantic coasts leave a margin for future growth of an average of 34 calls per day. This will take care of service needs over these circuits during the near future.

The estimate of telephone engineers is that the largest number of calls will be made over these lines at the average rate of 72 messages per day during the early spring of this year.

p&h



Three pole turn in ultimate 40-wire toll line of St. Croix Telephone Co., New Richmond, Wis. "P & H" Butt-Treated Cedar poles used.

"P&H Process" Poles are Better

Correct method of measuring top. Use steel tape.

—***because*** the distinctive "P&H" method of Butt Treatment assures these results:—deeper penetration of preservative,—more uniform penetration,—more uniform saturation,—greater amount of free oil.

The "P&H" Guarantee specifies, in writing, a full sapwood penetration to a depth of one-half inch—assuring lower per annum cost lines.

"P&H" Service supplies all cedar pole needs—***when you want them!*** Northern White or Western Red—Butt Treated or untreated.

"Still in the Lead"

PAGE AND HILL CO.

MINNEAPOLIS, MINN.

New York, N. Y., 50 Church St. Chicago, Ill., 19 So. La Salle St Dayton, Ohio, 854 Reibold Bldg
Kansas City, Mo., 517 Pioneer Trust Bldg. Omaha, Neb., 734 Electric Bldg.

Efficiency in Line Trouble Locating

The Trouble Problem Should Be of Interest to All Telephone Men—Some Suggestions as to Ways and Means for Reducing Lost Circuit Time and Excessive Expense Caused by the Item of Inaccurate Line Trouble Location

By Chris Stewart

The clearing of trouble is an every-day job. It has to be done. It costs money; in many cases much more than it should. In some cases this is true because the parties doing this work do not know of the existence of certain time-saving instruments for this purpose; in others, because they think that in order to use these instruments it is necessary to have a technical education. This is not true and any parties reading this article who are interested in the clearing of trouble by economical methods will be interested in what follows.

Of course, proper construction and routine repairs, such as replacing insulators, trimming trees, pulling slack, etc., will eliminate considerable trouble; but as yet no telephone line has been built that will not get in trouble. To clear this trouble when it occurs is a job that has to be done.

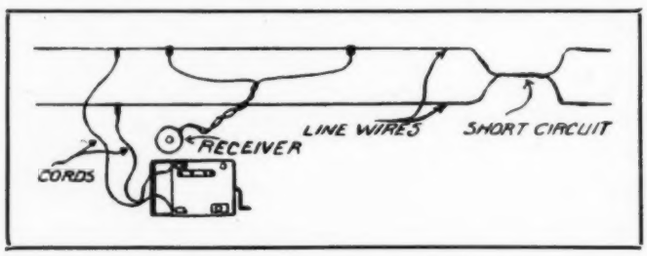


Fig. 1. Method of Connecting for a Short Circuit or a Cross.

To do this economically, it is essential that the repairman have a way of determining which way the trouble is from him and about how far. With this at his command, he need only travel that portion of the line between himself and the trouble, while without it in many cases he would travel over miles of the line that would gain him nothing.

It is impossible to drive an automobile and watch the wires. Therefore it is essential that repairmen have means for determining from any point which way to go to the trouble. This is also very true of repairmen clearing trouble on railroad lines with a speeder. It is also essential that this be accomplished without the use of pencil and paper calculations and by parties who do not happen to have the advantage of a technical education, because this class of work is practically always done by a non-technical man.

It can be readily seen that when a lineman can determine for a certainty which way the trouble is from him, he can clear the trouble in the quickest time and with the least amount of travel. Thus the cost of unnecessary time and travel is saved.

Many times a lineman is so routed that when he clears one line, the nearest point on the next line in trouble is at or near a central point on the line. In this case it is absolutely essential that the lineman know which way to go when he strikes the line, in order to clear the trouble in the shortest time and with the least expense.

And when a lineman comes to a point where the line goes two or three ways, he must guess at it and travel over that leg of the line where he thinks the trouble is—and his guess has just as much chance of being wrong as right. In case he goes the wrong way, the time and expense of traveling that portion of the line will be a loss.

The old method of making this test was to open the line; that is, cut one or both wires and test first one direction and then the other to tell which way the trouble was from him. This method was not very satisfactory, for each time a test was made the time taken to open and close the line was lost, and the line would have extra joints left in it. Test connectors have been used at certain points on the line, but this method limits the points of test, and the test connectors were always more or less troublesome.

After considering these points, it will be seen then that to clear trouble economically it is necessary to have a test set that will tell direction to trouble without opening the line. While a large number of telephone men may not know it, there is an instrument on the market that has these features.

This test set is a complete portable telephone, having the features described also. It is of light weight, weighing only seven pounds, and the battery used for transmitter is large enough not to freeze out or run down in too short a time. The set also has an indicator which tells about how far the trouble is from the tester.

The set is not complicated. The receiver clips are taken from the contacts on top of the set and connected to one side of the line as shown in Fig. 1. Then with the line cords connected across the line, by turning the generator crank and listening in with the receiver, a ringing noise will be heard when the receiver is on the line wire between the line cords and the trouble. This noise can be heard regardless of the

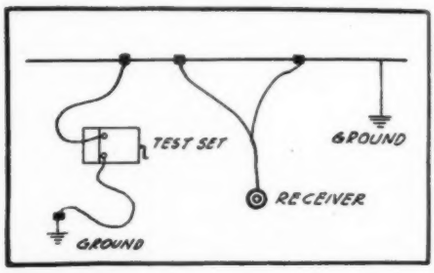


Fig. 2. Connections for Locating a Ground.

distance to the trouble, or the number of telephone bells on the line either way from the set.

In Fig. 1 are shown the connections for locating a short circuit and Fig. 2 shows connections for locating grounds. Note that one of the line cords in the latter case is connected to a ground.

The test set is a very compact, rugged instrument, Fig. 3, having a leather top cover, and weighs only seven pounds. The shoulder strap is equipped with a ring and hook so that it can be brought into the best operating position across the chest of the lineman, allowing the free use of both hands while on a pole.

Anyone desiring further information in regard to this instrument may write to Stewart Brothers, Ottawa, Ill., for a descriptive bulletin.

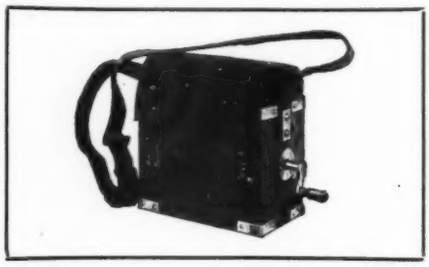


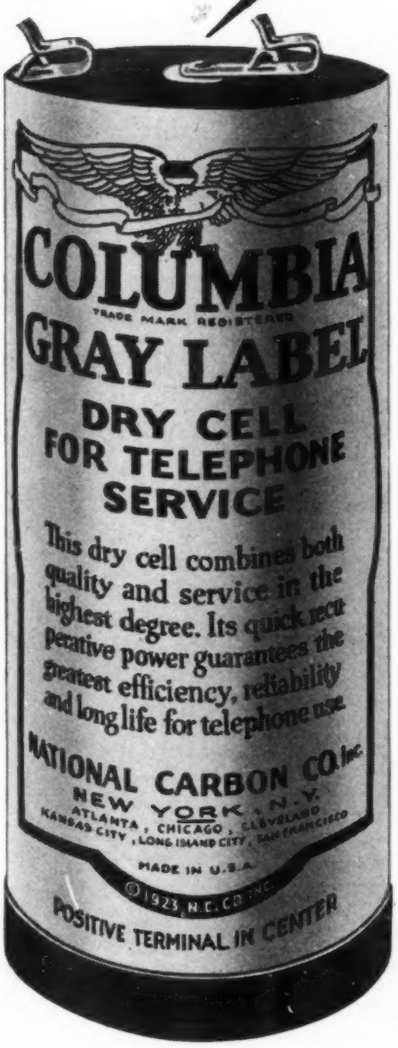
Fig. 3. The Compact Rugged Stewart Test Set.

Appropriations of New York Bell for New Construction.

Announcement has just been made by J. L. Kilpatrick, vice-president of the New York Telephone Co. that the board of directors of that company at its November meeting, authorized the additional expenditure of $4,345,340 for new construction in various parts of the territory served by the company.

This increases the total of appropriations made since the first of the year to $81,106,409, of which $65,854,030 was set aside for the construction of additional plant facilities in the New York metropolitan area.

Read the label!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SERVICE
This dry cell combines both quality and service in the highest degree. Its quick recuperative power guarantees the greatest efficiency, reliability and long life for telephone use.
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POSITIVE TERMINAL IN CENTER

THIS picture of the Columbia Gray Label Telephone Dry Cell is almost life size, so you can read the label. What you see on it is justly and fairly representative of the cell. It speaks for itself with a promise that is exceeded by its performance. Order a barrel and prove for yourself that the Columbia Cell provides telephone service at less cost per month of service.

NATIONAL CARBON CO., INC.
New York Chicago San Francisco
Atlanta UCC Kansas City
Unit of Union Carbide and Carbon Corporation

Columbia
Telephone Batteries
Best by test–they last longer

Measuring Automatic Dial Speeds

Testing Device Designed to Indicate Exact Speed of Subscriber's Dial—Apparatus Consists of Pendulum and Two Preselectors—Principle Underlying the Operation—Testers in Use in Various Places Throughout England

By R. F. Looser,
Siemens Brothers & Co., Ltd., London, Eng.

In the development of automatic telephone exchange apparatus, the correct functioning of which is largely dependent upon the impulses received from the subscriber's station, it becomes apparent that some ready method would be desirable for testing the speed of the subscriber's dial.

With this object in view, Siemens Brothers & Co., Ltd., London, England, designed a testing device capable of indicating the exact speed of a subscriber's dial. The general principles of the apparatus are described below.

The apparatus consists fundamentally of a pendulum and two preselectors. The principle underlying the operation is that the pendulum measures off a definite time period and the number of impulses received from the dial during that period is a measure of the speed of the dial.

The pendulum is normally in a latched position and is released by the first impulse received from the dial. As it is released, it receives a slight kick from the armature of the releasing magnet in order to insure that it returns again to its latched condition.

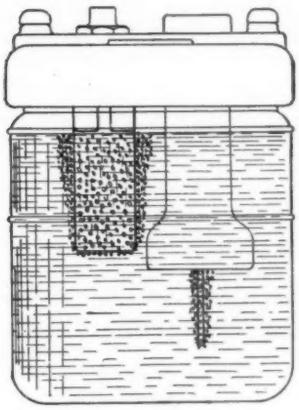
To obtain a maximum accuracy of timing, advantage is taken of the fact that an impuse consists of two parts—the break of the circuit, and the succeeding closure of the circuit. This is done by using two preselectors: one stepping forward at the break, and the other at the make of each impulse.

The two preselectors thus commence stepping forward with the first dial impulse at the same time as the pendulum is unlatched. During the swing of the pendulum, the preselectors step alternatively via relay contacts controlling the circuit; and when the pendulum restores to its latched position, the driving circuit of the preselectors is cut, thus preventing any further impulses from the dial from affecting them.

The bank contacts of the preselectors are connected to a group of lamps, and the lamp corresponding to the contacts on which the preselector wipers are standing lights at the termination of the impulses. Each lamp is marked with the dial speed

Fig. 2. Dial Speed Tester.

Fig. 3. Close Up of Pendulum Mechanism of Dial Speed Tester.



Balkite is the only charger whose correct operation is evident at a glance

Consider what the following exclusively Balkite features mean to the battery maintainer:

1 The mere fact that gas is rising from the electrodes as shown in the cut indicates that the charger is operating.

2 The approximate charging rate can easily be estimated by observing the amount of gassing.

3 If the Balkite cell is gassing and the electrodes and electrolyte have normal appearance, there is assurance of operation for at least a period of weeks.

4 Any possible cause of trouble is immediately visible to the maintainer.

5 The Balkite Charger does not suddenly cease operation immediately after inspection.

6 Being simple and visible in operation, the Balkite Charger is easy for the maintainer to understand and operate.

On all types of installations the charger that can be most readily inspected and maintained will give the most reliable and efficient service. It is these qualities that make Balkite the ideal charger for telephone service. Write for descriptive bulletin.

FANSTEEL PRODUCTS CO., Inc., *North Chicago, Ill.*

Distributors

AMERICAN ELECTRIC COMPANY, INC., *State and 64th Streets, Chicago*

Fansteel Products Company, Inc.
North Chicago, Ill.

Please send me a copy of bulletin TC-8 describing the Balkite Chargers.

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FANSTEEL

Balkite

Battery Chargers

which causes it to light, so that direct reading of the dial speed is given.

To restore the apparatus for further use, a reset key is used which de-energizes the relays and allows impulses from either a relay interrupter or a motor interrupter to return the preselectors to their normal positions.

Provision is made for testing the dial on the instrument at the subscriber's premises by connecting the line under test, via the test desk, to the dial speed tester.

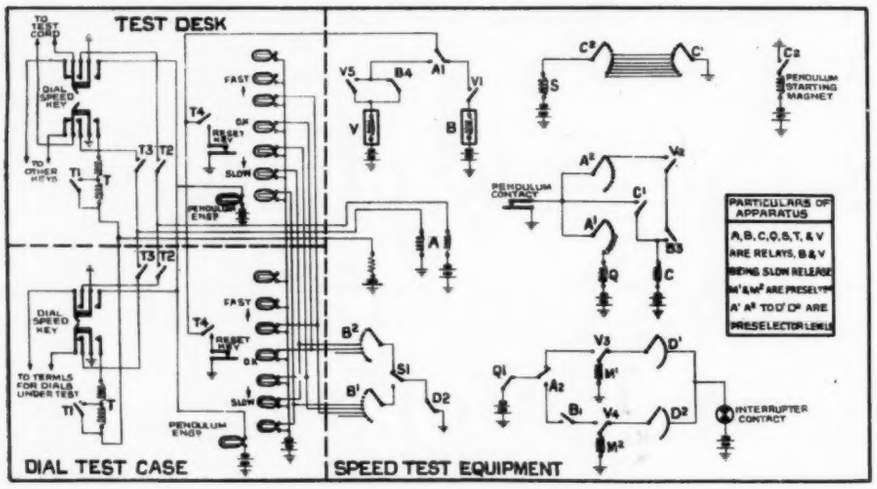

Fig. 1. Dial Speed Test Circuit.

A circuit can also be taken into use from the bench used for repairing dials, and a group of lamps is provided there in order that the speed of the repaired dial may be tested without assistance from the test clerk.

As a means of indicating when the tester is in service, a pendulum-engaged lamp glows, but to definitely prevent interference with the set during use, a lockout relay, *T*, is incorporated in the apparatus at the test desk and at the dial test case.

Fig. 1 shows a simplified schematic from which the circuit operation can easily be traced; Fig. 2 shows one of the speed test equipments which includes relays, preselectors and pendulum; Fig. 3 is an enlarged view of the pendulum mechanism showing the details quite clearly.

These testers have been in use for some years, giving very satisfactory results Among other places, they have been included in the testing equipment in exchanges supplied to the British Post Office at Grimsby (1918), Stockport (1919), Southampton (1923), Swansea (1924), Kirkcaldy (1925), and Edinburgh (1926).

Expansion Plans of Bell Company of Pennsylvania.

A total of $25,573,000 is to be spent by The Bell Telephone Co. of Pennsylvania this year for expanding the telephone plant throughout the state of Pennsylvania, according to the recently approved budget figures for that organization announced by Leonard H. Kinnard, president. Practically all portions of the commonwealth where the Bell company operates will come in for a share of the expenditures in prospect.

Although a large portion of the expenditures will be used for central office equipment more than one-third of the total amount of money to be spent is for "outside plant." In round figures this expenditure amounts to $9,875,000 for the state.

Approximately $5,900,000 of this amount will be spent for storm-proof cable construction in underground ducts and on pole lines. The total wire in these cables will amount to 374,000 miles. About 95 per cent of all Bell telephone wire in Pennsylvania is now enclosed in cable, and wires thus protected are not likely to be damaged and cause service interruptions due to storms.

Some of the outstanding storm-proof cable jobs that will be added to the system during 1928 include the erection of a line between Pottsville and Frackville, continuation of the work on the Pittsburgh-Charleroi cable, new cable from Hays Station to McKeesport and the installation of a section of conduit for accommodating additions to the toll cable that stretches between Philadelphia and New York City.

About $2,500,000 is to be spent for new building construction. This will include major additions to several existing offices and the construction of new offices throughout the state. "Radcliff" and a central office for the downtown district are to be built in Philadelphia, and "Franklin" and another office, the location of which has not been determined, are to be constructed in Pittsburgh. An expenditure of $300,000 is being set aside for the construction of the Wilkes-Barre central office building and the final work is to be done on the change from the manual to the dial type of central office equipment in Scranton.

Poles for new lines and replacements represent a portion of the year's outlay. If the 1928 pole requirements in the state next year were used to support a new telephone line, it would reach from Philadelphia to St. Louis.

Telephone engineers have estimated that there will be about 56,000 telephones added to the system in Pennsylvania during the year. In arriving at this net figure, they predict that in all approximately 179,000 telephones will be installed due to increasing demands for service, and that about 123,000 will be disconnected because of people moving from one city to another and other causes.

The daily average of local telephone calls in Pennsylvania during 1927 amounted to 4,500,000. During 1928 it is estimated that the local calls will total 4,900,000, an increase of 400,000 a day. An average of 278,000 out-of-town calls were made by telephone users in the state during last year. This figure will also be increased during 1928, telephone engineers have estimated, to an average of 295,000 per day.

Installation of Repeaters Completed at Lincoln, Neb.

The Lincoln Telephone & Telegraph Co. has completed the installation of repeaters in its headquarters office at Lincoln, Neb. These are similar in type to those which make possible the transcontinental service, and have the power of increasing transmission without distorting sound.

The Western Electric Co. has had ten men in Lincoln for the past three months putting the equipment in place, with Foremen O. W. Lane in charge. C. C. Donley, traffic engineer of the Lincoln company, superintended the work. Exhaustive tests proved satisfactory.

Traffic Superintendent R. S. Brewster says that this will effect an improvement of long distance service all over the company's territory in southeastern Nebraska. Although the repeaters are located at Lincoln, transmission from practically all towns where calls are made to distant points is through the Lincoln toll center, and consequently may be strengthened by the repeater equipment.

The two Omaha-Beatrice, Omaha-Fairbury and Omaha-Hastings circuits are permanently in place, while the operators at Lincoln make all the other connections. The repeaters are flexible and may be used on any connection. They are known as cord-circuit repeaters, being connected into a circuit by the operator when a call is put through.

C. W. Motter, publicity director, who is an entirely truthful gentleman, is fearful that the new improvement may cause family discord. Hastings has a traveling man who regularly calls his wife from Kansas City. A repeater was put on the line, and his voice was so clear and strong that the wife demanded an explanation as to his whereabouts. She insisted he must be in Hastings or near by, and her husband had to put in several minutes overtime clearing up the situation and referring to the telephone operator for confirmation.

Super Quality Vitrified Clay Conduits

Smooth — Straight
Safe — Economical
Permanent

NOTICE

WE are pleased to announce a change in our marketing policy. Effective January 1st, 1928, we will (except in a few isolated territories) sell direct to our customers.

Through this arrangement we are enabled to render a more efficient service and at the same time assure the quality of our conduits at all times.

→ Please Send Inquiries Direct to the Company ←

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INCORPORATED
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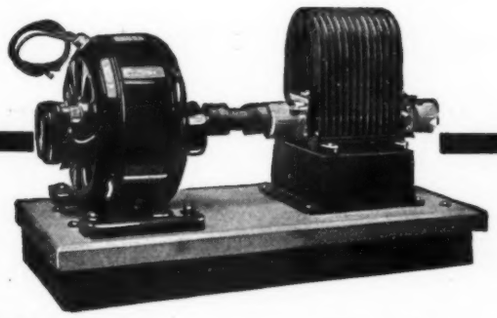

Holtzer-Cabot

Motor Ringing Magnetic-Generator

GIVES BETTER RINGING SERVICE

Does away with troublesome batteries. Operates from a lighting circuit. Does not interfere with radio reception. There is nothing to get out of order. A few drops of oil occasionally is all the attention needed.

Write for Specifications

The Holtzer-Cabot Electric Co.
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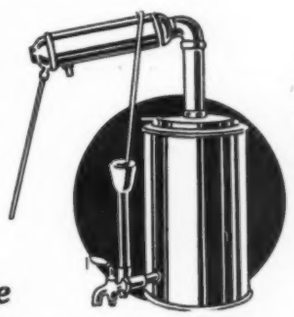
1878 BARNSTEAD STILL AND STERILIZER CO. T. M. Reg.



for Storage Battery Service

Ask the

"Mountain States'" Sub-stations - - -

HUNDREDS of Barnstead Battery Service Stills are supplying chemically-pure distilled water for storage batteries in the "Mountain States" and other telephone sub-stations. Distilled Water is essential to the efficiency, economical maintenance, and long life of storage batteries. Barnstead Stills produce it automatically, continuously, unfailingly—at a cost of next to nothing. Stills in all sizes. Heated by gas, high pressure steam, electricity, or kerosene. A Barnstead usually saves its price in a few months.

Write for Descriptive Catalog on Battery Service and Laboratory Stills

BARNSTEAD STILL & STERILIZER CO., Inc.
10 Lanesville Terrace FOREST HILLS, MASS.

BARNSTEAD
WATER STILLS

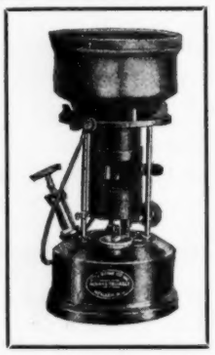
ONLY DISTILLED WATER IS CHEMICALLY PURE

With the Manufacturers and Jobbers

New Furnace Manufactured by Otto Bernz Co., Inc.

The Otto Bernz Co., Inc., manufacturers of furnaces, torches and plumbers' tools, has placed on the market a new kerosene-gasoline furnace, No. 32, which is designed to take the place of the "B" telephone furnace manufactured by the company in the past.

The shield is made of heavy sheet steel and measures 9¼ inches in diameter. It has a heavy malleable iron base and a double steel ring at the top which reinforce the shield and make it durable.



New Kerosene-Gasoline No. 32 Furnace of Otto Bernz Co., Inc.

The handle is made from heavy steel rod and is large in size so as to clear the large shield.

The new furnace is fitted with a new style burner, which will burn for a long period before it becomes carbonized. It is then merely necessary to replace the clogged pipe with a new one, at which time the burner will work for another long period. It starts in two minutes and produces a fierce, hot, blue flame, which will melt metal or heat soldering irons quickly.

The burner shield is made of heavy sheet steel and is so arranged that the user can open the side to get at the burner. A malleable iron arm extends from one of the uprights across the furnace to hold the burner shield in place. This eliminates the three small nuts.

The pump measures one inch in diameter and is the patented "never leak" style, which is claimed to be a positive guard against leaks.

The uprights are made of heavy steel rod which reinforce the entire furnace.

A malleable iron plate brazed to reservoir holds the extra heavy uprights. This eliminates three openings at the top of the reservoir.

The reservoir and bottom are of heavy, seamless, drawn steel. The three extra heavy bushings at the top, and the bottom are welded into place. The capacity of the reservoir is one gallon. A funnel simplifies the filling of the reservoir. The filler plug has the patented "dust-proof" cap attached. A ring welded to the bottom reinforces the reservoir.

Complete details regarding the furnace may be obtained from Otto Bernz Co., Inc., Newark, N. J.

Clay Products Co., Inc., to Sell Direct to Customer.

The Clay Products Co., Inc., of Brazil, Ind., manufacturer of "Super Quality" vitrified clay conduits, is announcing a change in its marketing policy. Effective as of January 1, and excepting in a few isolated territories, it will sell direct to the customer.

The company has been manufacturing conduit for many years and supplies many of the large and the small telephone companies in this country and foreign countries. By the adoption of this new policy it will be in direct contact with the customer, which will reflect itself in service and quality. The engineering department will be of greater assistance to the telephone manager in the solution of underground problems.

Frank N. Gormley, who is well known in the telephone field, will remain in charge of conduit sales and will personally call on as many telephone companies as business will permit.

Inauguration of Pernambuco, Brazil, Automatic Exchanges.

In the issue of TELEPHONY dated February 26, 1927, advance information and illustrations were given regarding the new automatic exchanges which were being installed at Pernambuco, South America, by Siemens Brothers & Co., Ltd., London, the makers of the equipments. This work has been completed and the new exchanges, five in all, were placed in use on December 5 last. Pernambuco now has in operation an up-to-date telephone system which gives a full automatic service throughout the area.

History of the Hazard Companies Told in Booklet.

"Fathers of Industry" is the title of a little booklet just issued by the Hazard Mfg. Co., Wilkes-Barre, Pa., which gives a brief historical sketch of the Hazard companies and their founders.

These companies date back to the firm of Hazard and White, which had an iron foundry and wire mill at Falls of Schuylkill near Philadelphia before the war of 1812. The first wire suspension bridge in America was built in 1815 across the Schuylkill River and was designed and constructed by this firm of which Erskine Hazard was the senior partner.

The Hazard Wire Rope Works were in operation in Mauch Chunk, Pa., in 1846. The Hazard Mfg. Co. was incorporated March 13, 1868, and in 1870 the plant was moved to Wilkes-Barre, where it is still located, being housed in 17 buildings.

The Hazard Wire Rope Co., incorporated July 23, 1927, took over the manufacture and sale of Hazard wire rope, iron and steel wire and wire rope fittings on September 1, 1927. On November 1, 1927, the wire and rope division of the Waterbury Co. was acquired by the Hazard Wire Rope Co.

Manufacture of and distribution of electrical cables will be continued by the Hazard Mfg. Co., which will devote its energies exclusively to electrical wires and cables, including rubber insulated cables, lead encased cables, steel tape armored cables, steel wire armored cables, etc.

The booklet is attractively written and printed and sets forth many interesting stories in connection with the building up of the present business of the two companies.

Australia Announces Five-Year Program of Telephone Expansion.

Plans for the conversion of all of Australia's city telephones from the manual to the automatic exchange system, and for an extension of trunk-line services in all states, have been completed. In making this announcement, the acting Director of Postal Services G. G. Haldane said the cost was estimated at £3,000,000, and the program was set out to cover a period of five years.

Within that period 53 new automatic exchanges, serving 111,782 subscribers, would be opened in the Commonwealth; most of them would be conversions of manual exchanges, but a few would be additional to the number of exchanges already in existence.

The principal additions to the trunk-line services would be on the lines between the capital cities, but there would be extensions to many parts of the country. Rural automatic exchanges, such as had been installed in a number of small towns in Victoria and New South Wales recently, would be established in numerous other towns throughout Australia.

One Feat of Modern Communication and Transportation.

What modern methods of communication can accomplish was graphically illustrated a short time ago when a woman in Corning, Cal., was informed that the only chance to avoid the amputation of an infected foot was to reach a hospital within a few hours.

Using the long distance telephone, she called up an air pilot at Klamath Falls, Ore., who made the 200-mile flight to Corning in less than two hours. He took the woman aboard and flew another 200 miles to San Francisco, arriving at the hospital, where previous telephonic arrangements had been made, in time to prevent amputation.

Where FAHNESTOCK Goes — Profit Grows

FAHNESTOCK PROTECTOR MOUNTING 2-B

FAHNESTOCK Protector Mounting 2-B, widely used by Telephone Companies for the protection of line circuits and instruments. It is made for six and ten wires and will take line fuses and arrestors supplied by the Graybar Electric Co. and other manufacturers. The six wire mounting fully equipped is illustrated above. All parts are made from the best bronze obtainable and are assembled and screwed securely to a base made of the highest quality of porcelain. Special Fahnestock Clips assure tight electrical connection without soldering.

Prices on Application

FAHNESTOCK ELECTRIC COMPANY
Long Island City, N. Y.

Lower Your Line Construction Cost with WEJ-LOCK Guy Wire Anchors

WEJ-LOCK means ECONOMY

Wej-Lock Anchors are made in the following sizes for the strains indicated, made of certified malleable iron. No. 40 is installed in an 8" hole, spreads to 20" (4 wing) equipped with ¾" rod and carries a 16,000 load with safety.

No. 20 is installed in a 6" hole, spreads to 16" (4 wing) equipped with ⅝" rod and carries a 10,000 load with safety.

No. 10 is installed in a 6" hole, spreads to 16" (2 wing) equipped with ⅝" rod and carries a 6000 load with safety.

We furnish all sizes fitted with rods of any length required. Every anchor guaranteed to be as represented.

Wej-Lock anchors are spread by running the thread through the lower block, thus forcing the wings out and up into the solid earth.

~and here's the WEJ-LOCK boltless clamp~

"The Harder the Pull - the Tighter the Clamp"

Made of malleable iron, galvanized.

Wej-Lock boltless clamps hold till the cable breaks without a slip. Do not damage the cable. Are installed in a few seconds.

Made for ¼", 5/16", ⅜" and ½" cable.

Manufactured By

WEJ-LOCK MANUFACTURING CO.
Winterset Iowa

Make Yourself Expert in Telephone Practice

These five great telephone books give you the best and most complete idea of what the telephony expert must know.

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Mitchell's

Principles and Practice of Telephony

These five books place thousands of practical facts at your command for instant use.

Beginning with a comprehensive survey of the basic principles involved, the author discusses such subjects as telephone apparatus, circuit elements and analysis, typical cord combinations, telephone power plant equipment, coil winding, the toll switchboard and toll equipment in the multiple office.

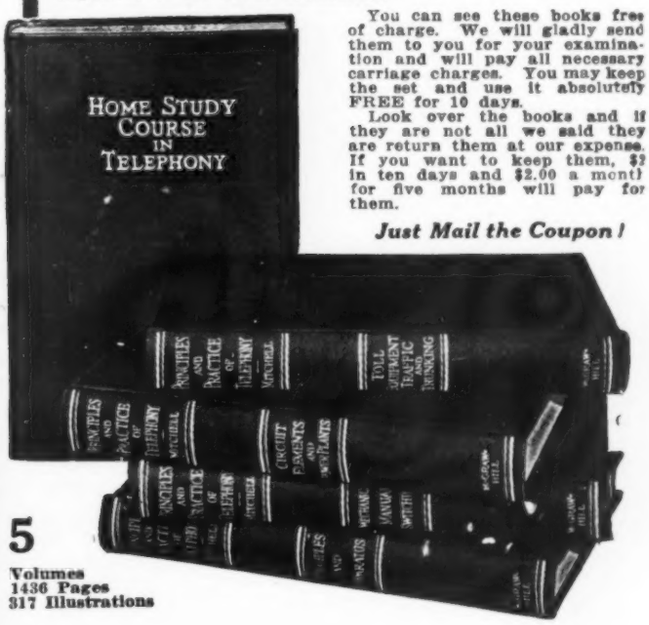
You learn about toll trunking, the nature and laws of telephone traffic, machine and automatic ringing, call distribution, trunk mechanical switching, mechanical-manual switching, etc.

All these subjects with scores of others, equally important, are treated in detail. Illustrations are used freely throughout the books, and a comprehensive index enables the reader to put his finger immediately on any desired fact.

To earn an expert's pay, you know that an expert's knowledge is necessary. With these books you get the combined experience of many telephone experts—down in black and white, with 317 illustrations to help you.

Examine this great set free

Nothing we could say about the Home Study Course in Telephony could possibly be as convincing to you as an actual inspection of the books themselves.



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5 Volumes
1436 Pages
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Gentlemen:—Please send me MITCHELL'S PRINCIPLES AND PRACTICE OF TELEPHONY (shipping charges prepaid), for ten days' free examination. If satisfactory I will send $2.00 in ten days and $2 per month until $12.00 has been paid. If not wanted, I will write you for return shipping instructions. **(Please write plainly and fill in all lines.)**

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1-7-28

What the Commissions Are Doing

Up-to-the-Minute News Regarding the Activities of State and Interstate Commissions, Courts and City Councils in Matters Concerning Telephone Companies—Summary of Commission Orders and Schedule ot Telephone Hearings

Michigan Bell Ouster Suit and Bell 4 Per Cent.

Whether the state may control the Michigan Bell Telephone Co. or whether the telephone company controls the state, is the question involved in the state's quo warranto suit in the state supreme court against the telephone company, according to the supplemental brief filed December 21 by William W. Potter, attorney general.

The attorney general is seeking to force the telephone company to disclose details of its contract with the American Telephone & Telegraph Co. to the Michigan Public Utilities Commission, or give up its right to do business in the state as a corporation.

The telephone company adheres to the proposition, it is claimed in the state's brief, that it has the legal right to "syphon the money belonging to the rate payers using telephone service without consideration, into the pockets of the American Telephone & Telegraph Co. and that the legislature and the commission and the courts are powerless to prevent it."

The attorney general contends that the state has regulatory powers over the telephone company and that it is the duty of the company to submit to public regulation, or to get out of business. It also is contended that the company has refused to submit to public regulation in this case.

"It has been and still is the contention of the Michigan Bell Telephone Co. that the question of whether or not its operating expenses are reasonable or not, is none of the state's business," the brief states.

"This is carrying the principles of capitalistic society beyond the pale that it has hitherto dared to take, but it may be that this position is entitled to judicial sanction —if so, it should receive it."

Peace between the state and the Michigan Bell company loomed for the first time in nine years on December 22, when Attorney General Potter consented to allow the state's quo warranto suit against the company to be delayed until the end of the present court docket. Mr. Potter had previously stated he would not consent to another delay unless the telephone company would agree to the state's terms.

Following Mr. Potter's announcement, it was reported that the American Telephone & Telegraph Co. had cut its 4 per cent contract with the Michigan company to 2 per cent. The attorney general would not comment on this report and refused to say whether the state's suit would be withdrawn if it was true.

Mr. Potter declared while a member of the public utilities commission, that he believed a 2 per cent contract between the Michigan Bell and the parent company would be agreeable to the state. It was because the A. T. & T. Co. would not reveal the cost of the service rendered under the contract that the state started legal proceedings, contending that the Michigan company was guily of non-use and misuse of its charter.

The Index for Volume 93 of "Telephony."

The index for Vol. 93 of "Telephony," which was completed with the issue of December 31, 1927, is now ready for distribution among those who keep complete files.

In this index are listed all of the important articles which have appeared between July 1 and December 31. It will be supplied free of charge to those making application.

Radio Corporation to Establish Radio Photo Service.

Service for transmitting photographs by commercial radio between New York and San Francisco will be available should the Federal Radio Commission consent to a project outlined in an application filed December 31 by the Radio Corp. of America.

The Radio corporation applied for a permit to proceed with the construction and installation of the first unit of the project, which will be located at Rocky Point, N. Y.

Application for a similar permit for the second unit to be situated at Bolinas, Cal., a suburb of San Francisco, will be submitted in a few days, it was indicated. The first unit was described as an 80-kilowatt broadcasting station to operate on three low-wave channels.

The Radio corporation expressed its belief that the demand for coast-to-coast transmission of photo-radio facsimilies of pictures, documents and other messages is sufficient to justify the establishment of the service.

Business Men Appeal from Indiana Rate Decision.

An appeal from the decision of the Indiana Public Service Commission, which recently granted an increase in rates to the United Telephone Co., of Kirklin, has been filed in the Clinton circuit court by business men of Kirklin. The increase has been hard fought by residents of the community.

The telephone company filed its petition with the commission June 23, alleging that the rates then in effect were inadequate to cover operating expenses. A hearing on the question was held at Kirklin July 14.

At that time the commission caused an appraisal of property to be made, which showed operating revenue from April 1, 1926, to March 31, 1927, at $5,898.10, a total of $591.88 less than the operating expense for the same period. An increase in rates was ordered effective November 1, on the express condition that the company was to bring its service up to a satisfactory standard.

The new rates run from $1.75 (rural party line) to $3 (single business line), with a discount for prompt payment. An appeal from this decision then was taken by the patrons.

Hearing Completed on Rate Increase at LaPorte, Ind.

The Indiana Public Service Commission now has the evidence in the petition of the LaPorte County Indiana Telephone Co., LaPorte, Ind., for a rate increase before it. The hearing was concluded at Indianapolis on December 15. The objectors finished their case and rebuttal witnesses were used by the telephone company. The chamber of commerce, city of LaPorte and LaPorte County Farm Bureau are protesting the rate increase.

Property Owners Held to Be Not Only Real Estate Owners.

The Iowa Supreme Court recently affirmed the judgment of the district court in the suit to enjoin W. H. Fowler, owner of the Fowler Telephone Co., Pella, Iowa, from obstructing streets with telephone lines under claim of franchise granted at an election. There were four voting precincts in the city of Pella at the time the election was held to grant the appellee, Walter H. Fowler, a right to operate a telephone system within that municipality.

Preliminary to the vote on the submission of the franchise, there was presented for the consideration of the mayor a petition containing the names of 113 persons purporting to be property owners within the four voting precincts. At least 25 of these persons were from each subdivision. Only ten signers are claimed not to be "property owners," as required by the section of the state statute. However, excluding these, there would result a deficiency in at least two of the districts.

Basis for the disqualification was placed upon the fact that this minority group each owned "personal" but no "real property."

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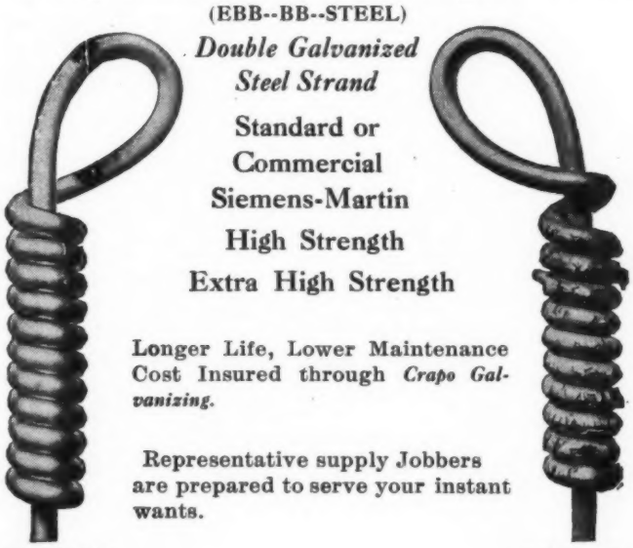

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Upon presentation to the city official, it was held that the signatures were sufficient, and, accordingly, the election was called, vote taken, and franchise granted. The appellant insisted that the mayor, in truth, had no petition before him, and was without jurisdiction in the premises, due to the fact that in the instances named, holders not of "real" but of "personal" property were permitted to sign the petition.

The court, in ruling upon the statute which specified that the election should be held upon petition of 25 property owners of each voting precinct in the city, or 50 property owners in any town, stated that the aim in the statute was to place initiation in the substantial residents.

Measurement to determine this standard was ownership of "property." Frequently, chattel investments involve thousands of dollars, while land holdings are meager, and vice versa. Essentially, the criterion is reached, no doubt, in one as well as the other.

Michigan Bell Telephone Co. to Issue Common Stock.

The Michigan Public Utilities Commission has issued an order authorizing the Michigan Bell Telephone Co. to issue $35,000,000 in common stock.

The issue was asked by the telephone company for the purpose of retiring demand notes of an equal amount.

Midwest Company Acquires Telephone Plants in Two Towns.

The Missouri Public Service Commission has granted the applications of H. J. Elliott to sell the Rockville Telephone Co., Rockville, and of F. L. House, owner of the Appleton City Telephone Exchange, Appleton City, to the Midwest Telephone Co.

The Rockville Telephone Co. was sold for $11,500, and the Appleton City Telephone Co. for $27,000.

No formal hearings were held on the applications, as in each case a letter was received from the mayor of the town, stating that there were no objections to the transfer of the property.

Transfer of Property Authorized by Minnesota Commission.

The Willow Creek Telephone Co. has been authorized by the Minnesota Railroad & Warehouse Commission to purchase all of the physical property of the Sterling-Amboy Telephone Co.

The Willow Creek Telephone Co. is a corporation operating a local exchange at Vernon Center, has part ownership in the local exchange in the village of Amboy, and operates an extensive system of rural lines in the vicinity of Amboy and Vernon Center. The Sterling-Amboy Telephone Co. is a corporation having part ownership in the local exchange at Amboy and operates an extensive system of rural lines in the vicinity of Amboy.

Joint ownership of the Amboy exchange has not resulted in adequate service to the subscribers of the village. Lack of cooperation in the development of the rural districts and the operation of the rural lines has resulted in a certain amount of unsatisfactory service in the rural districts.

This case involved the transfer of all of the physical property of the Sterling-Amboy Telephone Co. to the Willow Creek Telephone Co., and the consolidation of the properties should be of material benefit to the public interests. The rates for service of both companies are the same and no change in the service relationship or rates will be made. The commission gave no consideration to the price paid for the property.

Osage Valley Company, Mo., Authorized to Buy Exchanges.

The Missouri Public Service Commission has authorized the Osage Valley Telephone Co. to buy from S. T. Neill, trustee, Charles F. Mumma and J. D. Boulware, the exchanges at Osceola, Lowry City, Humansville, Flemington and Weableau, and to deliver in payment $30,000 in principal amount of its common stock consisting of 300 shares of the par value of $100 each, and $13,000 in principal amount of its 7 per cent cumulative preferred stock consisting of 130 shares of the par value of $100 each.

The Osage Valley company was authorized to issue and sell for cash at par, $37,000 in principal amount of its 7 per cent cumulative preferred stock consisting of 370 shares of the par value of $100 each, and to use the proceeds for the purpose of making extensions and improvements of property.

It was shown at the hearing that S. T. Neill of Clinton, acting as trustee for a corporation later to be formed, on October 8, 1927, entered into a contract with C. F. Mumma of Osceola to purchase for an agreed consideration of $25,000 the local telephone exchanges at Osceola and Lowry City, which exchanges heretofore had been owned and operated by C. F. Mumma under the name of the St. Clair Telephone Co.

Subsequently, on November 14, 1927, the Osage Valley Telephone Co. was incorporated under the laws of Missouri by S. T. Neill and certain of his associates pursuant to the arrangement. The Osage Valley company now desired to exercise the rights of S. T. Neill, trustee under the contract of October 8, 1927, by taking over the telephone exchange properties.

It was further shown at the hearing that the Osage Valley Telephone Co., on November 23, 1927, entered into a contract with J. D. Boulware of Humansville to purchase for an agreed consideration of $18,000, the local telephone exchanges at Humansville, Flemington and Weaubleau, which heretofore have been owned and operated by J. D. Boulware under the name of Inter-County Telephone system.

The commission upon consideration of all the evidence and testimony herein presented and after due deliberation was of the opinion that there existed in this case sufficient property and earnings of property to warrant the issuance of the securities requested to be authorized; that the money, property or labor to be procured or paid for by the issuance of the securities was reasonably required for the purposes specified herein. Such purposes are not in whole or in part reasonably chargeable to operating expenses or to income, the commission stated, and decided that the petition of the applicant should be granted.

Increased Rates Authorized With 24-Hour Service.

The Twin Valley-Ulen Telephone Co. has been authorized by the Minnesota Railroad & Warehouse Commission to place in effect an increased schedule of rates at its Ulen exchange on the first day of the month following that in which a continuous 24-hour service is established there. Following are the old and new net monthly rates of the company at both exchanges.

	Old	New
Individual line, business	$2.00	$2.50
Individual line, residence	1.25	1.50
Rural multi-party	1.25	1.25
Rural switching	.35	*7.20

*Annual gross.

Rural switching rates to be paid annually in advance with a discount of $1.20 if paid within the first month of the twelve months for which bill is rendered.

The Twin Valley-Ulen Telephone Co. is a partnership operating local telephone exchanges at Twin Valley and Ulen, serving approximately 430 telephones at Twin Valley, which includes 60 rural stations on a switching basis, and 203 telephones at Ulen, which includes 119 rural stations on a switching basis. The company also operates toll lines connecting the two exchanges as well as a toll line between the villages of Twin Valley and Mahnomen.

As to the Twin Valley exchange, the commission was of the opinion that the existing rates yield sufficient operating revenue to provide for the necessary operating expenses, depreciation and a fair return upon a fair value of the property constituting the Twin Valley exchange, and the rates petitioned for that exechange were denied.

The operating expenses of the company are reasonable, the commission found. The operating revenues for the Ulen exchange for several years have not been sufficient to provide for the depreciation and a fair return upon a fair value of the property. If night service is to be furnished by the company at Ulen, the additional expense

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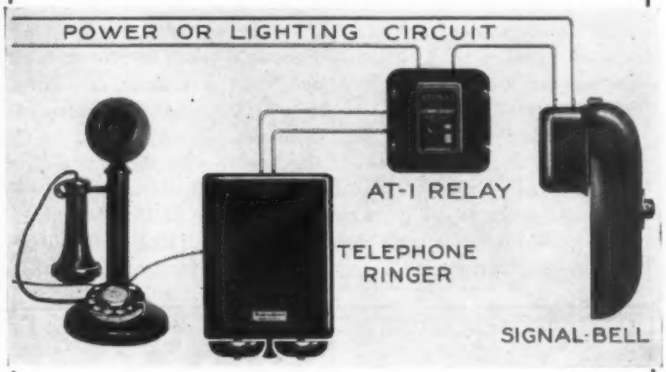

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tc furnish such service will exceed the additional revenue to be accrued at the petitioned rates, with a consequent reduction in the net income. The commission was of the opinion that if there is a demand for continuous 24-hour service by the subscribers, it is the duty of the company to furnish such service, and in this case authorized an increase in the rates to enable the company to furnish such service when the subscribers demand it.

Upon review of the facts, the commission found that the existing rates for the Twin Valley exchange are fair and reasonable; the present rates at the Ulen exchange are unreasonable and the rates petitioned for are fair and reasonable.

Toll Rate Between Mankato and St. Clair, Minn., Allowed.

The Minnesota Railroad & Warehouse Commission recently granted the joint application of the Mankato Citizens Telephone Co. and the St. Clair Telephone Co. for authority to establish a toll rate between Mankato and St. Clair.

The rate authorized is: Station-to-station message, 10 cents for the first five minutes and 5 cents for each additional three minutes; person-to-person message, 15 cents for the first three minutes and 5 cents for each additional one minute.

The Mankato Citizens Telephone Co. operates an automatic exchange at Mankato, and the St. Clair Telephone Co. operates a magneto telephone exchange at St. Clair. The two towns are about 12 miles apart and have telephone connection over two trunk lines. One of the trunk lines is owned entirely by the Mankato Citizens Telephone Co. and the other jointly by the two companies.

The Mankato company is willing to provide additional facilities required, but claims that in order to do so it must be paid more than the $120 per annum by the St. Clair company which it has had in the past in order to take care of the additional maintenance and fixed charges required by the added facilities. The St. Clair company is unable to pay more for the service. Any additional expense to the company will require an increase in the monthly rates charged its subscribers. The existing rates of the St. Clair company do not now provide sufficient revenue to meet all of the expenses of the system.

To discontinue the flat charge for the service to Mankato and substitute therefor a message rate will reduce the expenses of the St. Clair company, the commission found, and place the cost of the service directly upon the user, and will tend to delay an increase in the monthly rates paid by the subscribers of the St. Clair company.

A toll charge will reduce the traffic and tend to curtail trivial and unnecessary messages, permitting the use of the lines for the more important messages, making it unnecessary for immediate expenditures by both companies for additional lines between the two towns.

The two companies were therefore permitted to establish and place in effect as of January 1, 1928, a schedule of toll rates between Mankato and St. Clair.

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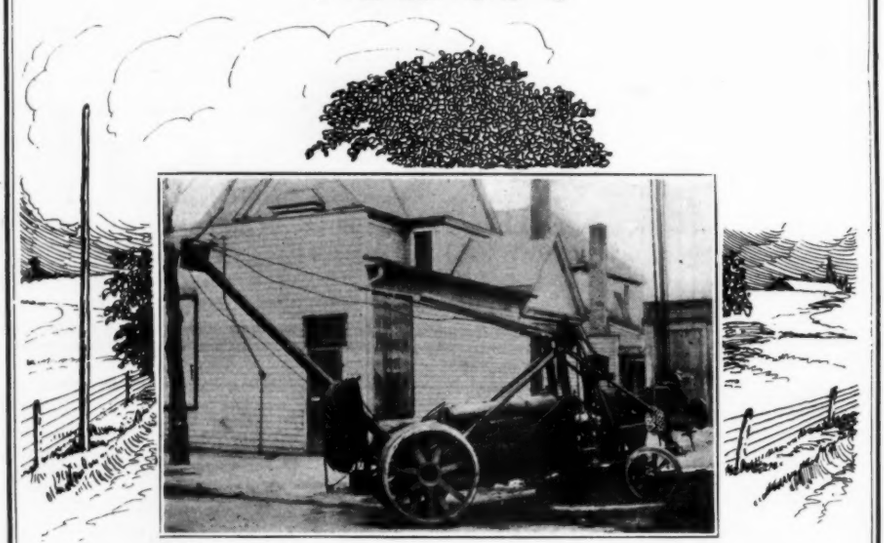

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Montevideo, Minn., Authorized an Increase in Rates.

The Northwestern Bell Telephone Co. has been authorized by the Minnesota Railroad & Warehouse Commission to place in effect an increased schedule of rates at its Montevideo exchange. The old and new net monthly rates of the company at this exchange are:

	Old	New
Individual line, business	$3.50	$4.50
Two-party line, business	3.00	3.75
Individual line, residence	2.00	2.25
Two-party line, residence		2.00
Four-party line, residence	1.50	1.75
Multi-party rural	1.50	1.50
Rural switching	6.00	6.00

The Montevideo exchange serves approximately 1,075 town stations and 363 company-owned rural stations.

The petitioner submitted exhibits covering operating statements for the year 1926. It also presented an appraisal of the property constituting its Montevideo exchange as of May 1, 1927, in which the reproduction cost new value was shown to be $149,980.45, and the reconstruction new value

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depreciated, $136,067.07, the latter figure including $2,354.91, for working capital, and $16,107.42 for going concern value.

The operating revenues for the year 1926, for the Montevideo exchange were $30,788.27, the operating expenses, including depreciation, taxes and uncollectibles, were $27,896.23, leaving a net income available for return of $2,892.04. The estimated operating revenues under the petitioned rates are $36,080.87, the operating expenses including depreciation, taxes and uncollectibles, $28,669.03, leaving a net income available for return of $7,411.84.

Authorized to Close Small Exchange Account of Losses.

Permission has been granted by the Nebraska State Railway Commission to the Northwestern Bell Telephone Co. to close its exchange at Rogers, Neb., a town of 120 population, midway between Schuyler and North Bend.

Owing to the closeness of the neighboring towns, Rogers has been found to have had its growth halted and there is no possibility of its ever getting any larger. The exchange operation now represents an out-of-pocket loss for the company, and there is no chance that it can better the financial returns except by a raise of rates to an almost prohibitive point.

Testimony of the company showed that it had sustained a net loss for each of the last five years, averaging $4,177.72 a year. The exchange has been run very economically and satisfactory service furnished. The alternative of higher rates was put up to the patrons and 44 of the 57 signed an agreement consenting to the removal of the exchange to Schuyler, being more than the 66 per cent required by law.

The company is permitted by the order to make the change effective at once. It has had two sets of rates at Rogers. For the local exchange, gross rates were $3.25 for business, $2.25 for individual residence and $2.00 for party residence. For the combined Rogers and Schuyler service the rates were $3.75 for business, $2.50 and $2.25 for residence and $2.75 for rural lines. It was shown that if remunerative rates were fixed, the Rogers business rate would have to be $5 and residence $3, with $1 and 50 cents added for additional exchange service.

The new rates authorized for patrons of the Rogers exchange with service from Schuyler are: Business, $3, residence and rural, $2.50. The commission found that the only objections raised were that town pride was hurt and a fear of impaired service. There is no question, it finds, but that the service will be improved, and town pride cannot be allowed to influence the commission in bringing about economies for the public and the telephone company.

The commission finds that the maintenance of an exchange at Rogers is an uneconomic waste which it is the duty of the state to stop. It is pointed out that nobody gets an increase in rates, most of them get greater service for less money. The new rates will reduce Rogers revenues $170 a year and cut overhead $700 at Rogers, converting a loss of $638 into a net of $370, counting in added operating costs at Schuyler.

The company has agreed to maintain a toll station at Rogers for public convenience. The commission orders require that an arrangement be made so that subscribers making advance payments may pay the rental to a Rogers business house, and after the discount period has expired the bills go to the company's Schuyler office.

Sale of Company Stock at Par to Employes.

The Nebraska State Railway Commission heard the application on December 28 of the Lincoln Telephone & Telegraph Co. for authority to issue $500,000 of common stock to be issued at par to employes only, under the employes' purchase plan that has been in force for a half-dozen years.

Stock of the company is now selling on the market as high as 115 with some sales reported at 120. For this reason Commissioner Curtiss suggested that the sale to employes at par might be challenged as a discrimination, and gave as his notion that it was taking surplus that belonged to the stockholders and gave it to the employes.

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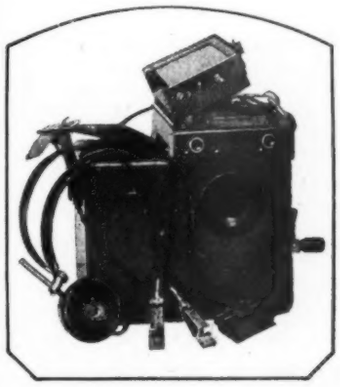

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Can you think of any surer way to gain the fullest measure of the good will, friendship and co-operation of your subscribers? Would not the ownership of your Preferred stock by your subscribers give you a pleasant freedom from unfounded complaints and unjust criticisms—would it not give you the strongest kind of protection against hostile legislation and unfair treatment in rate cases?

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We have a booklet which tells in some detail just what Customer Ownership will do for you—and just what **we** can do to help you secure Customer Ownership. We shall be glad, upon request, to send you a copy.

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President Frank H. Woods said that because the company was able to get its money cheaper, it had not issued any common stock, which carries an 8 per cent return, for some years, and that while the stock was undoubtedly worth more than par at the present price of money, there was such a small amount of it traded in that there was no certainty that the putting on the market of even 500 shares might not break the price materially.

Mr. Woods said that it was very largely a welfare proposition, and that so far as the stockholders were concerned they had voted approval of this plan, and would do so again if the commission desired an assurance from them on the point of whether they favored it.

He stated that the Lincoln company rates are materially lower than for communities of like size the country over, and that this might be explained in part by the fact that the average return on the money invested was less than 6 per cent and that the employes were none too well paid. It was a recognition of this situation that induced the company to make this stock sale offer.

He was of the opinion that the public, the stockholder and the employe profited alike from this stock purchase plan, in use with most large corporations, in that it made for greater efficiency and provided an opportunity for the worker not only to save but to invest safely.

J. H. Agee, general manager, said that any expenditure reduced the company surplus, and that the test was whether the benefits from such expenditure balanced at least the expense. The company sells about $65,000 a year under this purchase plan. An employe is limited in his purchases to one share for every $200 of annual salary; if he finishes the contract in three years, he gets a bonus of $4.50 on a share; and if he does not, he gets his money back at 6 per cent. More than 700 employes are owners.

New Jersey Bell Now Direct Subsidiary of A. T. & T. Co.

By approval of the New Jersey Public Utility Commission, control of the New Jersey Bell Telephone Co. on December 30, passed to the American Telephone & Telegraph Co. through a book transfer to the latter company of a majority of the outstanding stock of the New Jersey system. Involved in the transfer are 803,927 shares with a par value of $80,392,700.

The effect of the deal is to make the New Jersey company a direct rather than an indirect subsidiary of the large concern. Previously the company operating in New Jersey was a subsidiary of the New York Telephone Co.

Patrons of Washington Companies Ask Physical Connections.

Approximately 60 patrons of the Island Empire Telephone & Telegraph Co. and of the Sound Telephone Co. filed a petition

on December 16 with the Washington Department of Public Works asking that the companies be compelled to furnish direct telephone connection between Gig Harbor, Lake Bay and Longbranch on the mainland across from Point Defiance, Tacoma.

At present, it is pointed out, while there is telephone service in the several districts, there is no telephone connection between the settlements. With both companies involved, granting of the petitions might involve a merger of the two concerns. Hearing on the petition was set for March 28 at Gig Harbor.

Stockholders Pay Same Rates as Other Subscribers.

Following instructions from the Washington Department of Public Works, the Farmers' Mutual Telephone Co. of Whatcom county has filed a new tariff, effective December 20.

In accordance with a notice from the department, the telephone company filed its schedule minus the rates heretofore enjoyed by its stockholders, which the state declared to be unlawful. The stockholders now pay the same rates as other patrons although they have enjoyed the preferential rate for nearly 20 years.

Secretary L. A. Jones of Lynden reports that the company's directors plan to work out some form of dividend for the stockholders. Probably they will settle it at their meeting this month.

In its order, the department says that "the majority of rates contained in the new tariff constitute decreases over those contained in the present tariff. Small increases have been found to exist in auxiliary service, residence extensions, non-subscriber inter-exchange service to Glacier, and telegraph day letter service to Bellingham."

"Cradle" Type Telephones Removed as Old Rates Stay.

Removal of "cradle" type telephones, the popular model in motion pictures, which have a combined mouthpiece and receiver, has been started in Milwaukee, Wis., by the Wisconsin Telephone Co., it is stated, because the Wisconsin Railroad Commission refused to authorize a 50-cent increase in rates per month where such telephones are used.

Protests received by the company resulted in the company petitioning the commission for another hearing on the matter. The hearing will be held in Milwaukee on January 10.

Rates Schedule Charged Without Authority Validated.

The Wisconsin Railroad Commission has issued an order on the application of the Tri-County Telephone Co. for authority to increase rates. This, in fact, was an application to legalize rates which have been in effect for some time past. These rates

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appear to have been established by parties formerly in control of the company and were continued in effect by the present management. The commission in 1924 established a schedule of rates.

The following are the different net monthly rates with the rates now authorized by the commission:

	1924	Present	New
One-party business....	$ 2.50	$3.00	$3.00
Two-party business...	2.25	2.75	2.75
One-party residence..	2.00	2.00	2.00
Two-party residence..	1.75	1.75	1.75
Three, four and five-party residence .....*	1.60	1.60	1.60
Rural business.....	2.00	1.75	2.00
Rural Residence.....	1.75	1.75	1.75
Extension telephone...†	....	.75	.75
Extension bell.....	....	.25	.25

*Three and four-party only.
†Business extension, 75 cents; residence, 50 cents.

According to the commission's estimates based on figures of ten months' operation, the total revenues for 1927 would be $13,801.64 and expenses $9,725.16, leaving $4,076.48 available for depreciation and return.

"Total operating expense for the year," says the commission, "has been estimated to be $9,725. The company has 489 telephones. Yearly operating expense per station, exclusive of depreciation expense, is, therefore, $19.98. This figure is, perhaps somewhat unusual for a utility operating so few telephones, but it should be noted that three exchanges are maintained, which would tend to increase the operating cost per station. Moreover, the revenue available for depreciation and return will not allow a full return upon the probable value of the company's property and plant.

"The amount which under present conditions, is available for depreciation and return is $4,076.48. A reasonable allowance for depreciation and return may be taken as 14 per cent. The figure of $4,076 is 14 per cent of $29,117.71. The book figure of the company's property, as of October 31, 1927, is $53,428.89. Without passing on the accuracy of the book figure, it seems apparent that value in excess of $29,117 is present and that the rates now being applied yield revenues that are not excessive. Even if the allowance for depreciation and return is fixed at 13 per cent, the same condition is reached.

"With minor exceptions, therefore, we are of the opinion that the rates in question should be approved."

One of the exceptions noted by the commission is concerned with the rates for rural service. The company wishes to bill both business and residence rural customers at the same rate. This, the commission stated, is discriminatory, and would not be approved. The order provided a rate for rural business subscribers somewhat higher than that provided for rural residence subscribers.

The other objection to the schedule proposed was to the third provision of the rule governing charges for moves and changes; "For changing instrument or making changes in wiring and other equipment already installed."

"If the instrument requires changing," said the commission, "it is the duty of the company to make the change, we believe; and any special work not covered by the charge for inside and outside moves should be performed at actual cost."

Summary of Commission Rulings and Schedule of Hearings.

CALIFORNIA.

December 28: J. R. Fort, owner of Coast Telephone Co., authorized to establish on or before March 1, 1928, a telephone exchange to Morrow Bay, San Luis Obispo county, and to discontinue the Cayucous exchange in the Morrow Bay exchange area upon the establishment of the new exchange.

December 29: Applications of Lake County Telephone Association and Lower Lake Farmers Telephone Co., for authority to increase toll rates, dismissed. The companies were instructed to make arrangements for the transaction of business between their respective exchanges to give a comprehensive service to the territory in the vicinity of Lakeport and Kelseyville in Lake county.

ILLINOIS.

January 3: Hearing at Springfield in the matter of the application of the Standard Telephone Co. for an order approving the purchase and acquisition of certain properties and for a certificate of convenience and necessity to operate the telephone business in the territory now served by those companies, also authorizing the issue of $625,000 par value of first mortgage bonds and 1,500 shares of its preferred capital stock.

January 4: Hearing at Anna before Commissioner Kuhn in the matter of the proposed advance in rates of the Dongola Home Mutual Telephone Co. for service in Dongola and vicinity, stated in rate schedule Ill. C. C. No. 1 of the company.

January 5: Hearing at Springfield before Commissioner W. J. Smith in the matter of the proposed increase in rates of the Illinois Bell Telephone Co. for service in Quincy and vicinity, stated in rate schedule as filed by the company.

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MICHIGAN.

December 17: Michigan Bell Telephone Co. authorized to issue $35,000,000 in common stock.

MINNESOTA.

December 28: Willow Creek Telephone Co. authorized to purchase all of the physical property constituting the system of the Sterling-Amboy Telephone Co.

December 28: Tri-State Telephone & Telegraph Co. authorized to purchase all of the physical property of the telephone system of the Northfield Telephone Co. Rate schedules of the Northfield company cancelled and the rate schedules of the Tri-State Telephone & Telegraph Co. made to apply upon the completion of the interconnection of service between the systems.

December 29: Mankato Citizens Telephone Co., Mankato, and the St. Clair Telephone Co., St, Clair, authorized to establish and place in effect a modified schedule of toll rates between the two cities.

December 30: Northwestern Bell Telephone Co. authorized to place in effect as of February 1, the rates as applied for at its Montevideo exchange.

December 30: Twin Valley-Ulen Telephone Co. authorized to place in effect on the first day of the month following that in which a continuous 24-hour service is established at its Ulen exchange, an increased schedule of rates.

MISSOURI.

December 28: Osage Valley Telephone Co. authorized to purchase, maintain and operate and S. T. Neill, trustee, Charles F. Mumma and J. D. Boulware, authorized to sell the local telephone exchanges at Osceola, Lowry City, Humansville, Flemington and Weaubleau.

December 28: Sale and transfer by H. J. Elliott to the Midwest Telephone Co. of all of the property of the Rockville Telephone Co., together with all franchise rights and contracts in connection with the operation of the system, at an agreed price of $11,500, authorized.

December 28: Sale and transfer by F. L. House to the Midwest Telephone Co. of all of the property of the Appleton City Telephone Co., at an agreed price of $37,000, authorized.

OKLAHOMA.

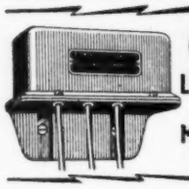
January 10: Hearing on application of Southwestern Bell Telephone Co. for approval of cancellation of toll contract with Arkansas-Oklahoma Telephone Co. of Poteau.

WASHINGTON.

December 16: Petition filed by patrons of the Island Empire Telephone & Telegraph Co. and of the Sound Telephone Co. asking that companies be compelled to furnish direct telephone connection between Gig Harbor, Lake Bay and Longbranch on the mainlaind across from Point Defiance, Tacoma.

WISCONSIN.

January 10: Rehearing at Milwaukee on application of Wisconsin Telephone Co. for authority to charge 50 cents a month additional for cradle type telephones. The commission refused to allow this charge and company announced that it would remove all of these type instruments that had been installed. Protests against this action received by company caused the commission to announce the hearing.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